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A large abstract graphic in the background of the cover, consisting of a complex network of interconnected nodes and lines in shades of purple and blue, suggesting a digital or technological theme.

CHARACTERIZING UNIDO'S APPROACH TO SCIENCE, TECHNOLOGY AND INNOVATION: A Review of Project Evaluations 2010 – 2020

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Characterizing UNIDO's Approach to Science, Technology and Innovation:

A Review of Project Evaluations 2010 – 2020

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Table of Contents

Abbreviations	ii
Executive Summary	v
1. Introduction	2
2. UNIDO’s strategic objectives for its work on STI	3
2.1. Identifying STI activities in the context of UNIDO’s work	4
3. Data and Methodology	8
3.1. Methodology	8
3.2. Data	8
4. Descriptive Statistics of Project Evaluations	11
5. Qualitative Analysis of Projects	14
5.1. Analytical Framework	14
5.2. Coding by Process	15
5.3. Coding by Themes	16
5.4. Coding of SDG9 terms	18
5.5. Crossed Analyses Between Frameworks	20
6. In-depth Analysis of Selected Projects	23
6.1. S&T and UNIDO’s interventions	23
6.2. Characterizing innovation in UNIDO’s interventions	28
6.3. SDGs and UNIDO’s interventions	32
7. Discussion and suggested way forward	36
7.1. Discussion	36
7.2. Further Studies	39
Relationship of UNIDO’s interventions with firms’ innovation	39
Relationship of UNIDO’s interventions with S&T	41
Relationship of UNIDO’s interventions with the SDGs	41
8. Conclusion	42
9. References.....	44
A.1. Annex 1: Definitions of Innovation	46
A.2. Annex 2: Descriptive Statistics of Projects.....	48
A.3. Annex 3: Coding System	56
A.4. Annex 4: In-depth Analysis and Examples	64

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Abbreviations

Abbreviation Definition

3ADI	Africa (Accelerated) Agribusiness and Agro industries Development Initiative	ITPO	Investment and Technology Promotion Office
AAAA	Addis Ababa Action Agenda	LAC	Latin America and the Caribbean
AfDB	African Development Bank	LC-MS	liquid chromatography – Mass Spectrometry
BAT/BEP	Best available techniques and best environmental practices	LDCs	Least Developed Countries
BIT	Business, Investment and Technology Services Branch from UNIDO	LMIC	Low and Medium Income Countries
BRN	Tanzania's Big Result Now programme	MACLE	Market Access & Compliance for Lebanese Exports
CBL	Cluster and Business Linkages Unit from UNIDO	MAP	Medicinal and Aromatic Plant
CP	Clean Production	MDG	Millennium Development Goal
CPCB	Central Pollution Control Board in India	MITI	Ministry of Industry, Trade and Investment of Tanzania
CTA	Chief Technical Advisor	MRL	Maximum Residue Limits
CTCN	Climate Technology Centre and Network	NCPC	National Cleaner Production Centres
DDT	Dichlorophenyltrichlorethane	NGO	Non-Governmental Organization
EABC	East African Business Council	NIP	National Implementation Plans
EAC	East African Community	NORAD	Norwegian Agency for Development Co-operation
EACB	EAC Business Council	NSI	National Systems of Innovation
EC	European Community	OECD	Organisation for Economic Co-operation and Development
ECOWAS	Economic Commission of West African States	PC	Project Components
EDIP	Enterprise Development and Investment Promotion Programme in Bahrain	PCB	Poly-chlorinated Biphenyls
EMAP	Upgrading the Medicinal and Aromatic Value Chain – Access to Export Markets (former Project executed by UNIDO)	PCDDs/PCDF	Polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans
ESCAP	Economic and Social Commission for Asia and the Pacific	PCP	Pentachlorophenol
ET	Evaluation Team	POP	Persistent Organic Pollutants
EU	European Union	PTC	Division of Programme Development and Technical Cooperation from UNIDO
EUROSTAT	The statistical office of the European Union	QUALEB	EU quality programme
FAO	Food and Agricultural Organization	SADC	Southern African Development Community
FSMSs	Food Safety Management Systems	SAP	SAP number from UNIDO's system
GHP	Good Hygiene Practice	SC	Stockholm Convention
GMP	Good Manufacturing Practice	SCW	Supreme Council for Women of Bahrain
GTIM	Global Technology and Industry of Mali, recycling company	SDG	Sustainable Development Goals
GVC	Global Value Chain	SDG1	End poverty in all its forms everywhere
HACCP	Hazard Analysis Critical Control Points	SDG5	Achieve gender equality and empower all women and girls
IPR	Industrial Property Rights	SDG7	Ensuring sustainable energy
ISID	Inclusive and Sustainable Industrial Development	SDG8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
ISO	International Organization for Standardization	SDG9	Build resilient infrastructure, promote inclusive and sustainable industrialisation, and foster innovation
IT	Information Technology	SDG10	Reduce inequality within and among countries
		SDG11	Making human settlement resilient and sustainable

SDG12	Ensure sustainable consumption and production patterns
SDG13	Take urgent action to combat climate change and its impacts
SDG14	Conserve and sustainably use the oceans, seas, and marine resources for sustainable development
SDG15	Halting land and forest degradation
SDG17	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development
SITPC	Shanghai International Information Technology Promotion Centre
SMEs	small and medium size enterprises
SPS	Sanitary and Phytosanitary Measures (SPS Agreement under WTO)
SPWA-CC	Strategic Programme for West Africa – Climate Change
STI	Science, Technology, and Innovation
STS	Science and Technology Services
SVI	Swiss Packaging Institute
TA	Technical Assistance
TAF	Technical Assistance Facility
TBS	Tanzania Bureau of Standards
TBT	Technical Barriers to Trade
TCB	Trade Capacity Building
TEST	Transfer of Environmentally Sound Technologies
TIUMP	Tanzania Industrial Upgrading and Modernization Programme
TUT	Tshwane University of Technology
UIS	UNESCO Institute of Statistics
UN	United Nations
UNBS	Ugandan Bureau of Standards
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization
UNODC	United Nations Office on Drugs and Crime
UPPOPs	Unintentional Produced Persistent Organic Pollutants
US	United States
USD	United States Dollars
UUT	Upgrading Unit Tanzania
VNCPC	Viet Nam Cleaner Production Centre

Executive Summary

Since its creation in 1966, the United Nations Industrial Development Organization's (v) mandate has always included the promotion of investment and technology transfer to foster industrial development (Browne, 2012). UNIDO actively contributes to debates and actual practice of industrial development in developing countries, addressing issues of resources and factor endowments, capability development, and the enhancement of framework conditions for industrialisation, using specialised knowledge and appropriate technologies.

UNIDO's mandate to actively contribute to industrial development, and the promotion of the development and diffusion of relevant science, technologies, and capacity-building, resonates with the Addis Ababa Action Agenda (AAAA) of the Third International Conference on Financing for Development. This recognises science, technology, and innovation (STI) as well as industrial development as powerful drivers of economic diversification and value addition, economic growth, and sustainable development (United Nations, 2015). The Lima Declaration advocates inclusive and sustainable industrial development (ISID) (UNIDO, 2013); while the Abu Dhabi Declaration calls on UNIDO and its partners to scale up UNIDO interventions that support technological learning, technology transfer, and innovation, particularly for small and medium size enterprises (SMEs), women and the youth (UNIDO, 2019). These mandates underscore UNIDO's commitment to the achievement of the SDGs, with emphasis on SDG9.

The above notwithstanding, the absence of a reference framework to identify and isolate the diverse UNIDO's industrial development and STI-related interventions makes it difficult to establish the distinct UNIDO's contributions to the achievement of developmental outcomes in Member States, particularly in ways that illustrate how the promotion of ISID and STI contributes to the achievement of the SDGs. There is room to reflect on the different UNIDO activities and to build a common understanding, possibly leading to the adoption of a working definition of what STI means, aligned to UNIDO's operations.

This report contributes toward this goal. The main objective is to understand how STI are promoted in the inputs, processes, and outputs of UNIDO's interventions, and relate this practical understanding of STI with the long-term impact on ISID that UNIDO aims to achieve. To this end, this report presents the findings from a qualitative analysis carried out on a set of UNIDO's project evaluations from 2010 to 2020, to deconstruct the link between STI inputs and outputs, as expressed in project activities, and their contributions to ISID and SDGs. The analysis followed a three-pronged approach. First, we built a database containing 207 project and 11 thematic evaluations conducted on UNIDO projects over the relevant period. Second, we applied content analysis and text search on these 207 documents to identify how STI dimensions are captured in UNIDO projects. Finally, the findings from this initial analysis were supplemented by a more in-depth content analysis building on a subset of 23 purposely selected documents.

The results of the analysis are summarised in six main conclusions:

- 1 UNIDO's interventions contribute mainly to the generation or improvement of Science and Technology Services (STS)** in the sectors and countries where the institution operates. STS include technical S&T support activities, scientific data collection and analysis, assistance for improvement of governance, management and legal framework supporting S&T, and preservation, interpretation and dissemination of scientific information and knowledge. These services are not directly related to R&D or with innovation but are necessary to improve the innovation systems of the sectors and countries where UNIDO works.
- 2 UNIDO's approach to innovation is through fostering technology transfer and technology adoption in firms.** UNIDO works towards a change in the institutions and governmental organizations related to the sectors intervened that will foster adoption of technologies in firms in the long run. This is most evident in programmes related to clean production and renewable energy.
- 3 UNIDO supports innovation in firms in an indirect way, through the effective use of pilot projects.** Most projects consist or include pilot programmes with few firms being direct beneficiaries. The expectation is that pilot projects, or proof of concept, will eventually lead to positive spill-overs in other firms. However, this is generally a passive objective, as UNIDO's interventions are bound in definite time and space.
- 4 UNIDO's work is aligned with SDG9, while also contributing to several other SDGs, notably SDG5, SDG7, SDG8, SDG10, SDG12, SDG13, and SDG17.** By design, the objectives of UNIDO's interventions are aligned with SDGs objectives, more specifically SDG9. However, considering the scale and time bound nature of those interventions, it is difficult to relate, directly, the outcomes and impact indicators to the SDGs.
- 5 UNIDO's ability to assess its contributions to SDG9 and other SDGs would benefit from more structured mechanism to describe how project outcomes and im-**

pacts flow from project activities toward specific SDGs. There is a lack of clear tracing from projects objectives to projects outcomes and their contributions towards SDGs. This gap in project design prevents UNIDO to develop a better understanding of the institution's actions as regards its mandate, and the pertinence of its developmental STS interventions.

6 UNIDO's contribution in STI and SDGs can be identified better in the medium- and long-term. To understand better the contributions of UNIDO to STI and SDGs in Member States can contribute to effectively assess and determine the pertinence of its interventions based on its mandate around ISID.

From the above, few recommendations can be highlighted and lines of further research and enquiry within UNIDO can be suggested. These further studies can be informative of the work conducted along new dimensions not evaluated before. They can also set future guidelines for more precise use of terms and methodologies in project design, execution, and evaluation. We propose the following lines of enquiry:

- 1 Conduct a strategic analysis of the demand from Member States for UNIDO interventions on innovation.** This study can contribute to understand the necessities of Member States on innovation programmes and policies, helping to change programmes design, execution, outcomes and indicators to actually satisfy the demand of its partners.
- 2 Conduct periodic evaluations of the impact of UNIDO interventions on innovation at the sectoral or national level.** An analysis of innovation focusing on specific country/sector and distinct from all other possible UNIDO interventions in the selected country/sector, can contribute to understand better the role of UNIDO on promoting innovation.
- 3 Conduct periodic evaluations of the impact of UNIDO interventions in a systemic way.** An analysis of UNIDO's STS activities and their effects on the innovation systems of beneficiary countries, and on different levels

– national, regional, and sectoral – would be helpful to understand synergies between UNIDO's programmes, best practices, and the importance of local factors and institutions on the effectiveness of UNIDO's projects.

4 Conduct a study to generate traceable indicators for projects that relate projects outcomes to impact indicators on the medium- to long-term, linking projects outcomes to ISID and SDGs. An analysis of the relationship and relevance of ISID to the achievement of the SDGs would provide a frame of reference for projects' Theory of Change and their associated outcomes, detailing specific indicators for future project evaluations.

5 Conduct periodic meta-evaluations of UNIDO's work and its long-term impact goals on SDGs. An analysis of UNIDO's interventions in relevant SDGs, using similar methodologies to the "Thematic Evaluation of UNIDO's Contribution to the MDGs" (UNIDO, 2012) can provide evidence of the organisation's actual contribution to the realisation of the SDGs.

In planning for these suggested studies, careful consideration should be given to the timeframes covered by

the evaluations and the time lapse required for UNIDO's interventions to reach or generate sufficient critical mass, thereby making it possible to correctly identify any system-level effects from projects on the working of innovation systems of Member States. Based on the findings from this study, one can suggest that an STS framework is of high relevance for UNIDO to generate substantive evidence on the relationship between its interventions and their effects on innovation, innovation systems, ISID and SDGs.

A final consideration can be made concerning the focus and aims of future project evaluations to make the STI, ISID and SDG components more structured and explicit, linking specific project outcomes with the broad objectives of UNIDO's work in these areas. Alternatively, UNIDO could plan for a regular set of specific evaluations on its impact on specific countries/sectors with respect to Innovation, S&T, ISID and SDGs; e.g., every 5 to 10 years. The latter approach would enable UNIDO to better understand the impact of its current interventions and assess the need for additional interventions, as required to accomplish the organisation's mandates.

1. Introduction

The United Nations Industrial Development Organisation (UNIDO) is the specialised agency of the United Nations that promotes industrial development for poverty reduction, inclusive globalisation and environmental sustainability. UNIDO's mandate is fully recognised in the Sustainable Development Goal 9 (SDG-9), which calls to “Build resilient infrastructure, promote inclusive and sustainable industrialisation, and foster innovation.”

The Organisation's programmatic focus is structured in four strategic priorities: Creating shared prosperity, Advancing economic competitiveness, Safeguarding the environment, and Strengthening knowledge and institutions. UNIDO has been a very active player both at the level of intellectual debate on the role of technology for industrialisation and at the level of capacity development and technical assistance for technology transfer; brokering collaboration and knowledge sharing between developed and developing countries.

Despite the importance of science, technology and innovation (STI) in work carried out in UNIDO; it is difficult to identify the impact of UNIDO's work on its Member States in terms of their development results on inclusive and sustainable industrial development (ISID). The main challenges to identifying UNIDO's impact are:

- ▶ At the operational level, as found in project documents, the description of UNIDO's work on STI remains at the level of inputs –capacity building, technology transfer, and so on;
- ▶ An independent, systematic evaluation of STI components in UNIDO's projects remains pending (UNIDO, 2018).
- ▶ At the strategic level, while the objectives of several UNIDO programmes and activities include explicitly their intention to foster innovation in the Member

States, the pathways towards achieving such a goal are usually insufficiently articulated (UNEP & UNIDO, 2008; UNIDO, 2010).

This lack of informed understanding of UNIDO's approach to STI makes it challenging to learn from past experiences and inform ongoing and prospective work on STI and the promotion of ISID. Addressing this gap is pertinent because STI, industrialisation and technical cooperation are dynamic fields. By aligning the Organization's approach to frontier knowledge around the contribution of STI to industrial innovation and industrial development would increase pertinence and impacts from UNIDO interventions. The emergence of new technologies affecting the way production and society are organised suggest that UNIDO's means, and interventions need to adapt continuously. Such adaptation should build on accumulated experience and a reference framework setting the goals and means to achieving intended results (UNIDO, 2010). However, this accumulated information and framework is not easily available within the organisation.

To close this gap, this report contributes to UNIDO's continuous efforts towards improving understanding of the role it ought to play in strengthening knowledge and institutions in Member States, building on its technical cooperation portfolio. More specifically, the objective of this project is to derive some strategic recommendations on how to track UNIDO's activities in the broad field of STI, and on the contribution of such activities to the achievement of the SDGs, with emphasis on SDG9. With this goal in mind, the report presents the findings of a systematic review of project evaluations and thematic evaluations of past and ongoing technical cooperation initiatives at UNIDO. Thus, we document and characterise UNIDO's involvement and contribution to STI, as drivers of ISID and the SDGs more broadly.

Since this study relies primarily on past project evaluations, it entails some methodological limitations. First, the sample might have a selection bias as only projects with available evaluations could be included and not necessarily projects that would best represent the different types of initiatives. In UNIDO's case, such a bias responds from the budgetary thresholds considered for a project to be subject to evaluation. Hence, the selection of projects with evaluations skews the sample to large projects funded mostly with extra-budgetary resources. Therefore, relatively small projects that are not subject to impact evaluations but that contribute to STI on Member States are not considered. Similarly, relying on past evaluations entails a significant time lag, as some of the findings may be based on past rather than current practices. Further, evaluation reports often provide information on impact in a limited and constrained time frame, restricting the conclusions on the effect of UNIDO actions in the Member States to the observed results of the projects. In the same token, impacts from UNIDO interventions may be underes-

timated, as unintended outcomes and spill over effects are difficult to capture in the absence of systematic, purposive evaluations.

The remainder of this report proceeds as follows: Section 2 identifies how STI is contextualized in UNIDO's work and interventions relating it with Science and Technology Services. The section also defines innovation and categorises possible innovative activities promoted by UNIDO. A description of the data and methodologies used to analyse the different documents is presented in section 3. Then, Section 4 provides descriptive statistics of the data, while section 5 presents the content analysis of the entire dataset in different areas of interest. Section 6 shows the in-depth analysis conducted on 23 selected evaluations. Section 7 discusses future studies that can be conducted to understand better the effects of UNIDO's intervention on an aggregated level. The final section concludes the report.

2. UNIDO's strategic objectives for its work on STI

UNIDO's vision is to eradicate poverty through promoting ISID. This vision combines principles of the Lima Declaration and has direct links to SDG9. The work of UNIDO and how it can relate to SDGs is graphically presented in **Figure 2.1** from its Medium-term Programme Framework 2018 – 2020 (UNIDO, 2017). While this framework is now superseded by the new Medium-term Programme Framework 2022 – 2025 (UNIDO, 2021), we decided to retain the former, as it was in place at the start of this study. Hence, it is the framework under which the evaluations will be better understood.

UNIDO's mission to promote and accelerate ISID in Member States is further structured in four strategic priorities for conducting its work (UNIDO, 2017):

- 1 Advancing economic competitiveness:** Support developing countries to include STI as a key driver for industrial diversification, value added generation and sustained growth by building trade capacities in industries as a seedbed for entrepreneurship, business investment, and innovation.
- 2 Safeguarding the environment:** Advance the abilities of developing countries to incorporate green principles and practices in their industrial activities. Support green industries by building institutional and industrial sector capacity related to resource efficiency and cleaner production technologies, and by improving waste management.

3 Creating shared prosperity: Promote industrial policies and the use of technologies that foster participation and opportunities for segments of the population traditionally left behind. To build productive capacities in an inclusive manner and aim to achieve equal opportunities for women and men, as well as for youth, and across social groups.

4 Strengthening knowledge and institutions: Support advancing the technical, policy and normative knowledge base and strengthening the institutional capacity for ISID, globally and in Member States. This will enhance UNIDO's positioning as lead agency in the industrialisation debates locally and globally through knowledge products and convening activities.

Work on STI in international organisations is a relatively crowded space: several UN and non-UN agencies have mandates to perform work on this topic. Nevertheless, UNIDO's specialised mandate around industrial development provides differentiation and a relevant entry-point to the countries. UNIDO's ability to intervene directly through pilot projects, policy advisory services and convening power offer good prospects to carve itself a niche while creating partnership opportunities with other development agencies, academic institutions, and private partners (UNIDO, 2018).

UNIDO's four core functions can contribute to support developing Member States' efforts to embed STI in their strategic development policies. UNIDO can assist in the adoption, development, and diffusion of technologies and innovations at different levels of intervention. For example, UNIDO can:

- ▶ Induce changes in the institutions and establish structures through new industrial policies or strategies and resources allocation, including developing legal and regulatory frameworks to support STI activities and programmes as they relate to industrial development;
- ▶ Buy-in to STI policies and commitment to the adoption of STI strategies as an integral part of national industrial development plans;
- ▶ Foster the adoption of practices/standards and norms that facilitate industrial innovation and the adoption of new technologies in manufacturing activities; Provide frontier knowledge and practical guidance around capacity building strategies, as needed to accelerate progress towards ISID.

To better understand the role of UNIDO on STI, first it is necessary to define the terms, and how to operationalise them.

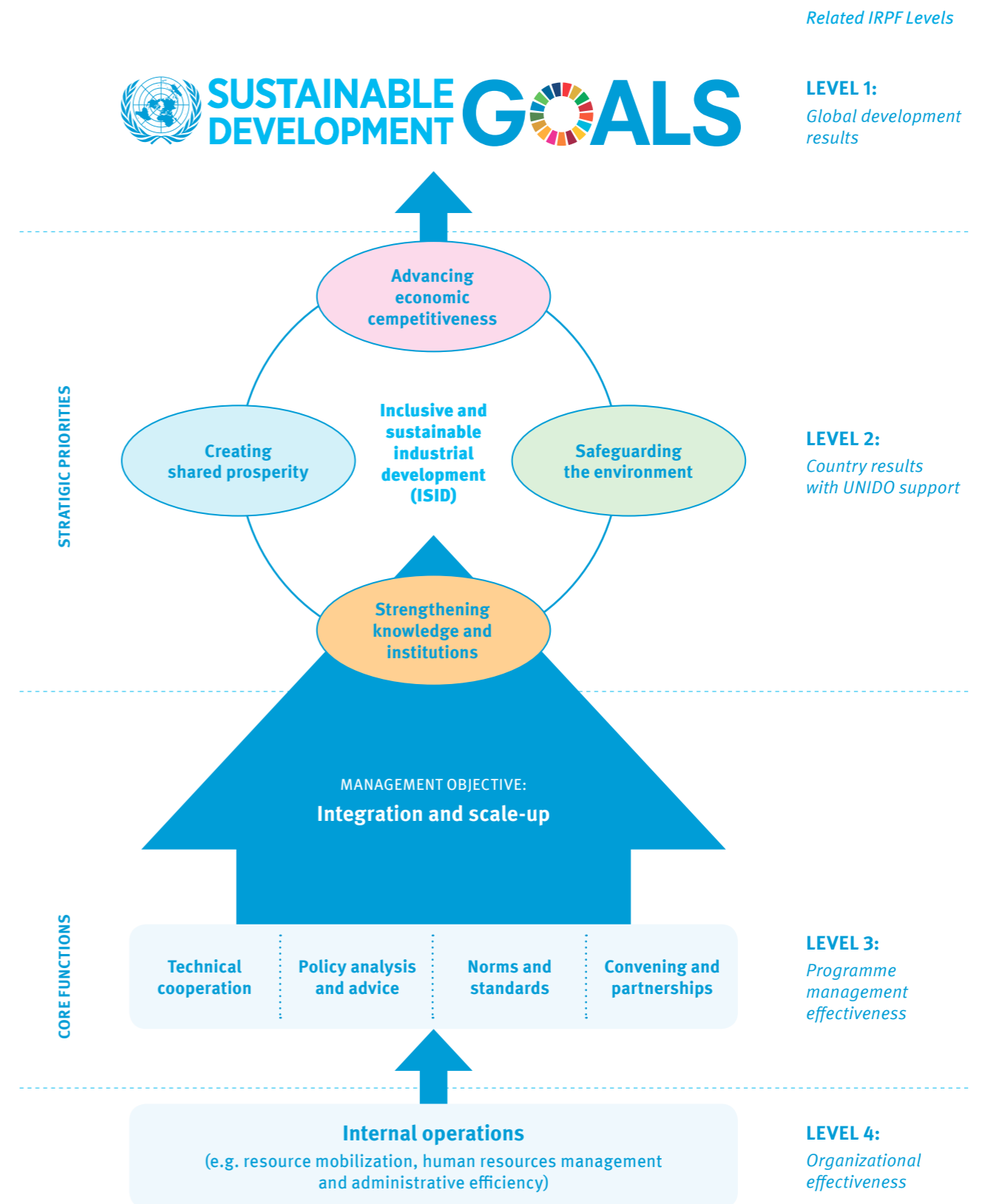
2.1. Identifying STI activities in the context of UNIDO's work

In 2018, UNIDO started a reflection on its role and contribution to STI as a driver of ISID, and its comparative advantage within the UN system regarding work on STI, as it relates to SDGs (UNIDO, 2018). Emerging from such initial reflection was that a necessary first step to understand the work done on STI, the Organization is to identify a suitable definition of what STI means in the context of its work. Such a definition should capture generally acceptable indicators for the different activities involved. One can argue that interventions in STI occur along a continuum. Many innovations entail pushing forward the frontiers of knowledge, which is the realm of science, but this may not always be the case. Innovation may involve learning to implement and use technologies already available elsewhere, often without doing R&D. The latter seems the

most frequent case in developing countries, and it often applies to most UNIDO interventions, which entail technology acquisition, imitation, and adaptation.

The term STI is often used as an all-encompassing, multidimensional, loosely defined concept, which integrates into a single, cohesive entity three closely interrelated but, in essence, different concepts (ESCAP, 2016; Comms Consult, 2018). This approach to understanding STI obviates the need to unpack its different components to distinguish their distinctive features, drivers and logics of operation, and associated metrics. The drawback is that such bundling of concepts leads to very loose use of the notion of STI as guidance for practical development interventions such as those deployed by UNIDO and its partners. More-

Figure 2.1 UNIDO's Strategic Framework



Source: UNIDO's medium-term programme framework 2018– 2020.

over, it makes tracing pathways from STI interventions into development outcomes problematic.

In this report, we tried to distinguish between the three categories embedded in the STI notion. To do so, we relied on the two most authoritative international sources of guidelines for measuring, collecting, and using data on STI, namely the Frascati Manual (OECD, 2015) and the most recent edition of the Oslo Manual (OECD and Eurostat, 2018). In addition, UNESCO (UIS, 2017) offers an update of definitions related to scientific and technological services (STS), which include several categories relevant to characterise UNIDO's work. Moreover, because these documents deal with measurement issues, they offer concrete recommendations on narrowing the scope of science and technology and innovation for the practical characterisation of UNIDO activities.

It is necessary to decompose STI in two areas: first, Science and Technology (S&T), and second, Innovation. These two are different even when they are highly related. S&T are usually understood as services and activities (STS) that can contribute to innovation. More specifically, STS acknowledge two distinct elements, namely science – generally interpreted as scientific research – as an activity that involves a formal method (i. e., systematic, empirical, and replicable) to study the physical or material world and of society; while technology refers to the application of scientific knowledge to develop techniques to produce a product and/or deliver a service or as the application of scientific knowledge for a practical purpose (ESCAP, 2016).

UIS (2017) expands the otherwise narrow scope of the original definition of STS to include those activities related to R&D but that fail to comply with all the criteria associated with R&D, mainly those of novelty or creativity (UIS, 2017). STS also includes various activities related to the generation, dissemination and application of scientific and technical knowledge that, for certain reasons, fall outside the scope of R&D, but that have relevant contributions to the functioning of science, technology, and innovation systems formally and systematically. STS differs from innovation because the latter may need not involve scientific methods, entail the application of technologies, or result in the generation, diffusion, or use of scientific knowledge (UIS, 2017).

As a result of the analysis carried out by UNIDO in 2018, it has been determined that the types of interventions that UNIDO performs mainly include training, capacity building, technical assistance, fostering technological upgrading, and supporting the systematic adoption of international standards to improve product quality, especially in trade and global value chains. From an STI perspective, all these interventions can be characterised as the provision of scientific and technological services (STS) which, according to UNESCO (2017), contribute to the generation of new knowledge and innovations, without involving R&D as a predominant activity. Activities constituting STS are summarised in **Table 2.1**.

Based on this typology of activities and services, the analysis of the programmes conducted by UNIDO presented in this report, is an effort towards better understanding of the organisation's work in the STI realm and how it contributes to ISID and SDG9 in Member States.

Regarding innovation, we will follow the definition in the latest Oslo Manual. Therefore, innovation is a term used to describe:

“A new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)” (OECD and Eurostat 2018, 20).

The generic term “unit” refers to the actor responsible for innovations, which are typically but not necessarily limited to firms. The current definition accepts “any institutional unit in any sector, including households and their individual members” (OECD and Eurostat 2018, 20). The Oslo Manual operationalises this definition of innovation by looking at it either as an activity or as an outcome of the activity.

As an activity, innovation includes “*all developmental, financial, and commercial activities undertaken by a firm that are intended to result in an innovation for the firm*” (OECD and Eurostat, 2018: 20). There are eight types of activities that firms can undertake in pursuit of innovation:

Table 2.1 Scientific and Technology Services (STS)

A. Technical S&T support activities	B. Scientific data collection and analysis	C. Governance, management and legal framework supporting S&T	D. Preservation, interpretation and dissemination of scientific information and knowledge
A.1 Engineering, architectural, environmental, other technical advisory services	B.1 Surveying, prospecting and mapping	C.1 Administration, management, funding of S&T	D.1 Preservation, interpretation and dissemination of S&T related knowledge
A.2 Metrology, standards	B.2 Astronomical and geophysical monitoring, environmental testing	C.2 Intellectual property protection	D.2 Publishing and translating of S&T books, journals and other forms of printed and electronic publications
A.3 Testing and quality control	B.3 Routine socioeconomic data collection and analysis	C.3 Analytical studies supporting S&T policy-making	

Source: UNESCO (2017)

- (1) Research and experimental development (R&D),
- (2) Engineering, design, and other creative work,
- (3) Marketing and brand equity,
- (4) Intellectual property (IP) related activities,
- (5) Employee training,
- (6) Software development and database activities,
- (7) Activities relating to the acquisition or lease of tangible assets, and
- (8) Innovation management activities.

When the actor undertaking the innovation is a firm, we talk about *business innovation*, as “*A new or improved product or business process (or combination thereof) that differs significantly from the firm's previous products or business processes and that has been introduced on the market or brought into use by the firm*” (OECD and Eurostat, 2018: 20).

Unlike previous editions of the Oslo Manual, OECD and Eurostat (2018) consider only two main types of innovations produced by a firm: product and business process innovations.

“A product innovation is a new or improved good or service that differs significantly from the firm's previous goods or services and that has been introduced on the market” (OECD and Eurostat, 2018: 21).

But “*a business process innovation is a new or improved business process for one or more business functions that differs significantly from the firm's previous business processes and that has been brought into use by the firm*” (OECD and Eurostat, 2018: 21).

In these definitions, business functions relate to:

- (1) Production of goods or services,
 - (2) Distribution and logistics,
 - (3) Marketing and sales,
 - (4) Information and communication systems,
 - (5) Administration and management, and
 - (6) Product and business process development
- (OECD and Eurostat, 2018).

Finally, at the level of outputs, (OECD and Eurostat, 2018) identify productivity, profits, jobs, and increasingly important social and environmental impacts (see **Annex 1** for a description of innovation objectives and indicators).

Given these definitions of S&T activities and services (STS) and Innovation, we will compare what is stated in the evaluations of the projects to these definitions to understand the real scope of UNIDO's activities and potential impact in relation to STI.

3. Data and Methodology

3.1. Methodology

This study builds on qualitative analysis of secondary data in two stages. First, a content analysis of 207 documents of project evaluations of UNIDO conducted during the period 2010–2020 was carried out. In addition to those, 11 Thematic Evaluations were analysed to identify general patterns in projects spanning several countries and several years of implementation under the same thematic framework. The Thematic Evaluations identify specific projects used in their analysis, that were used to conduct an in-depth analysis.¹

The analysis will focus also on identifying the organisations involved in project implementation, UNIDO partnership activities through projects; the objectives, amounts invested, and results obtained. Also, if there is detailed information on how UNIDO related with other organisations during the project, it will be highlighted and analysed.

The documents were inventoried by type of evaluation, as defined by UNIDO's independent evaluation office, and subjected to content analysis using the qualitative data analysis software NVivo12. Additional literature reviews

were conducted during the data triangulation phase in order to substantiate some emerging findings.

Project evaluations conducted before 2014 often relate to projects with no SAP number and not included on UNIDO's open data platform. In this case, the information needed was collected through a combination of queries on UNIDO's evaluation website, Infobase or directly from the Evaluation reports. Classification by region was made according to the World Bank's geographical classification.

In the second stage of the analysis, a subset of the project evaluations was used for an in-depth analysis. The selection of these documents was purposefully carried out based on Thematic Evaluations in the main areas of UNIDO's flagship interventions: Industrial Upgrading, Reduction of Persistent Organic Pollutants (POPs), Climate Technology Centre and Network (CTCN), Investment and Technology Promotion Offices (ITPOs), and National Cleaner Production Centres (NCPC). The number of projects selected for this in-depth analysis is about 10% of the total sample of documents (23 documents).

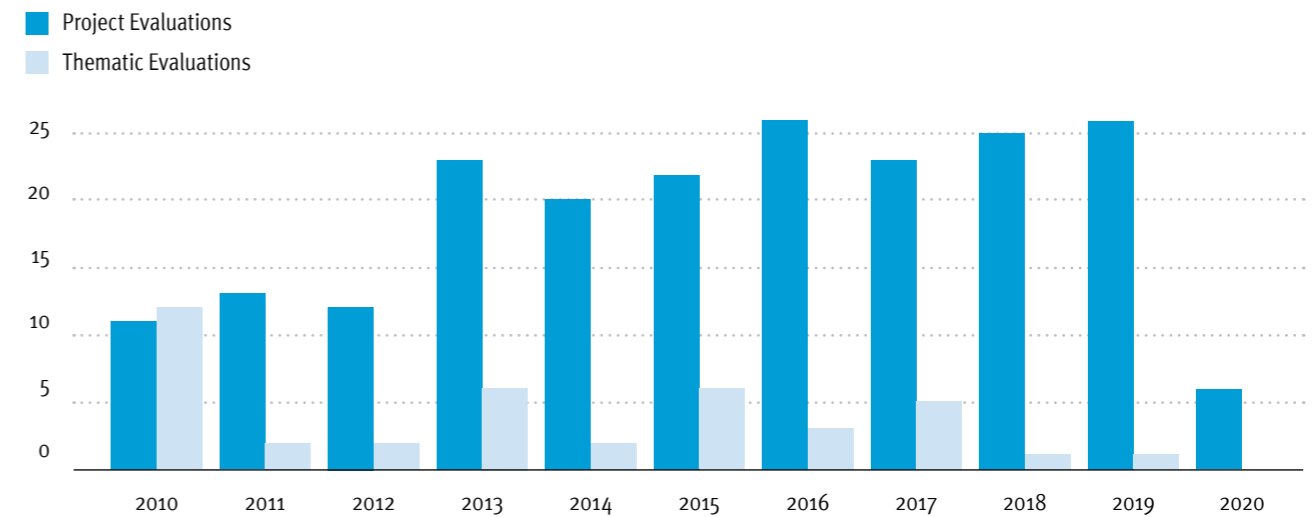
3.2. Data

The main sources of data for this exercise are UNIDO's project evaluations, as available through the Organisation's public website. The documents retrieved include those available up to December 2020, covering the 2010–2020 period (Graph 3.1). Whenever a report was available in more than one language, the English version was used.

According to Graph 3.1, most project evaluations are concentrated in the 2013–2019 period, while the thematic evaluations identified are highly concentrated in 2010. Table 3.1 presents the actual number of documents included in phase 1 and 2 of the analysis. All 207 project evaluations were included in the first phase of analysis.

¹ The analysis excluded evaluations performed on UNIDO's general management, including human resources management practices, or general operations at Head Quarters or field offices.

Graph 3.1 Distribution of Documents



Source: Authors based on UNIDO project evaluations database

Table 3.1 Selection of documents for analysis

	Total Documents	Used for Analysis	
		Content Analysis	In-depth Analysis
Project Evaluations	207	207	23
Thematic Evaluation	40	11	0
Total	247	217	23

Source: Authors based on UNIDO project evaluations database

For the second phase of analysis, we only focused on 23 documents of project evaluations, which are about ten percent of the entire sample.

The selection of documents for the second phase of analysis was done purposefully as mentioned above. Five main areas were identified:

- (1) National Cleaner Production Centres & Network (NCPC),
- (2) Reduction of POPs (Persistent Organic Pollutants),
- (3) Climate Technology Centres and Network (CTCN),
- (4) the Investment and Technology Promotion Offices (ITPOs), and
- (5) Industrial Upgrading.

Within these areas all thematic evaluation reports were selected to identify the specific projects that were included in their analysis from 2010 onwards. In addition, all other projects in the database that were within these subjects were identified. In total, there were 43 projects identified, and from these, 23 were randomly selected for in-depth analysis, giving preference to the projects analysed in the thematic evaluations. The distribution of the selected cases is presented in Table 3.2 and the list of the selected documents is in Annex 2.

Table 3.2 Distribution of selected documents for in-depth analysis by region and year

Region	Year											
	2010		2011		2012		2013		2014		2015	
	Identified	Selected	Identified	Selected	Identified	Selected	Identified	Selected	Identified	Selected	Identified	Selected
Africa			1	1			2	2			2	1
Asia	1	1	1	1	2	1	3	1			2	
Europe					1						1	
Europe and Central Asia					1							
Global									1	1	1	
Middle east and North Africa	1	1	1									
Total	2	2	3	2	4	1	5	3	1	1	6	1

Continuation:

Region	Year										Total	
	2016		2017		2018		2019		2020		Identified	Selected
	Identified	Selected	Identified	Selected	Identified	Selected	Identified	Selected	Identified	Selected		
Africa	3	3			1	1	3	2	1	1	13	11
Asia	3	2	1				3	2	2		18	8
Europe											2	0
Europe and Central Asia							1				2	0
Global	1				1						4	1
Middle east and North Africa	1	1							1	1	4	3
Total	8	6	1	0	2	1	7	4	4	2	43	23

Source: Authors based on UNIDO project evaluations database

The reader may notice the absence of project evaluations conducted in the Latin America and the Caribbean (LAC) region within the 23 selected projects for in-depth analysis. Within the projects selected in the Thematic Evaluations, there were only a few conducted in LAC coun-

tries, but all of them before 2010. In our main dataset of projects, only 12 correspond to evaluations conducted in the LAC region. None of them corresponds to the 5 areas of interest for UNIDO's work for this study. The regional distribution of projects will be discussed further below.

4. Descriptive Statistics of Project Evaluations

The distribution of the documents studied provides a first glimpse of the focalisation and areas in which UNIDO's work concentrates. From Table 4.1 it is possible to identify that the area *Safeguarding the Environment* is the most relevant followed by *Advancing Economic Competitiveness*. From 2015 onwards, UNIDO's work concentrates in three areas: *Safeguarding the Environment* (69 % of projects), *Advancing Economic Competitiveness* (23 % of projects),

and *Creating Shared Prosperity* (8 % of projects). However, most of the topics covered in the other areas seem to have been incorporated by these three main areas, therefore, there is continuity in UNIDO's work around the same thematic priorities. For example, some of the projects related to poverty reduction have the same topics as projects on the *Creating Shared Prosperity* area.

Table 4.1 Distribution of Documents by Areas of Work and Year

Thematic Priority	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Advancing Economic Competitiveness				1		1	4	7	7	7	3	30
Advancing Human Security in Post Crisis Situation		1										1
Creating Shared Prosperity			1	1	2	1	3	4	1		1	14
Energy and Environment	1	2	3	7	3							16
GB1 Exec Direct & Strat Mngt							1					1
Investment and technology promotion	1											1
Other/Executive Board/ South – South cooperation			1									1
Poverty Reduction through Productive Activities	5	3	2	6	3							19
Poverty Reduction through Productive Activities (Post Crisis)	2	1	2	3	4							12
Private Sector Development				1								1
Safeguarding the Environment				1	4	20	18	12	17	19	2	93
Trade Capacity Building	2	6	3	3	4							18
Total	11	13	12	23	20	22	26	23	25	26	6	207

Source: Authors based on UNIDO project evaluations database

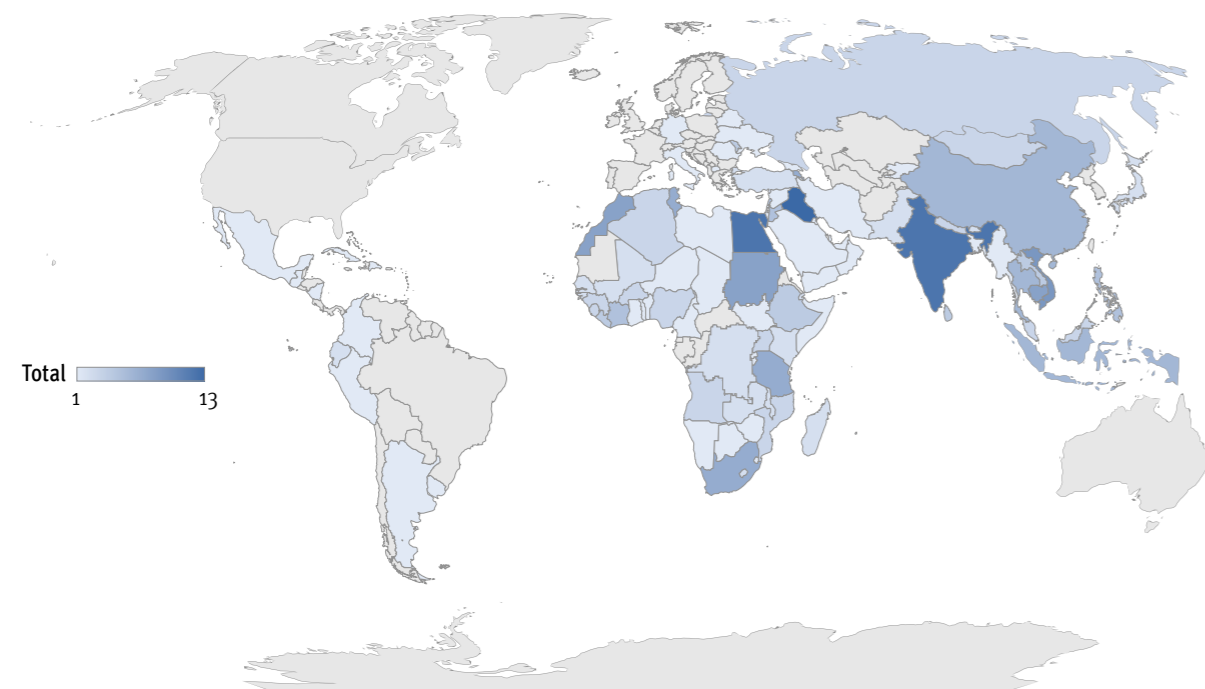
Regarding the regional distribution of project evaluations (Figure 4.1 and Graph 4.2), most of them were executed in Asia, followed by Africa, the Middle East and North Africa. The region of Latin America and the Caribbean (LAC) is the region with less projects from UNIDO and with no projects evaluated between 2018 – 2020.² Asia and Africa are the regions with more project evaluations, with Iraq (13), Egypt (12) and India (12) standing out as the countries with more project evaluations between 2010 and 2020. In Latin America and the Caribbean there is no country with more than two projects evaluated during this period.

With respect to the LAC region, there were only 12 project evaluations on the database, mainly concentrated between 2013 and 2018. The areas of UNIDO’s work in the region are: Safeguarding the Environment (58 % of projects), Advancing Economic Competitiveness (17%), Trade

Capacity Building (17%), and Energy and Environment (8%). Given that the LAC region has 33 countries, from which 22 are Member States of UNIDO, it seems that more projects (and project evaluations) and resources could be deployed in the region.

Finally, the budget allocated to the projects evaluated is presented in Table 4.1. The overall budget allocated to the projects evaluated has in general increased, with the exceptions of the projects evaluated in 2013, 2014, 2017 and 2020. In 2020 few project evaluations were published. However, the average budget per project evaluated has not changed much (between 2 and 3,5 million US Dollars) except in the evaluations from 2012, with an average budget of 6.7 million, and in 2019 with an average budget per project of 4.5 million.³

Figure 4.1 Global Distribution of Projects

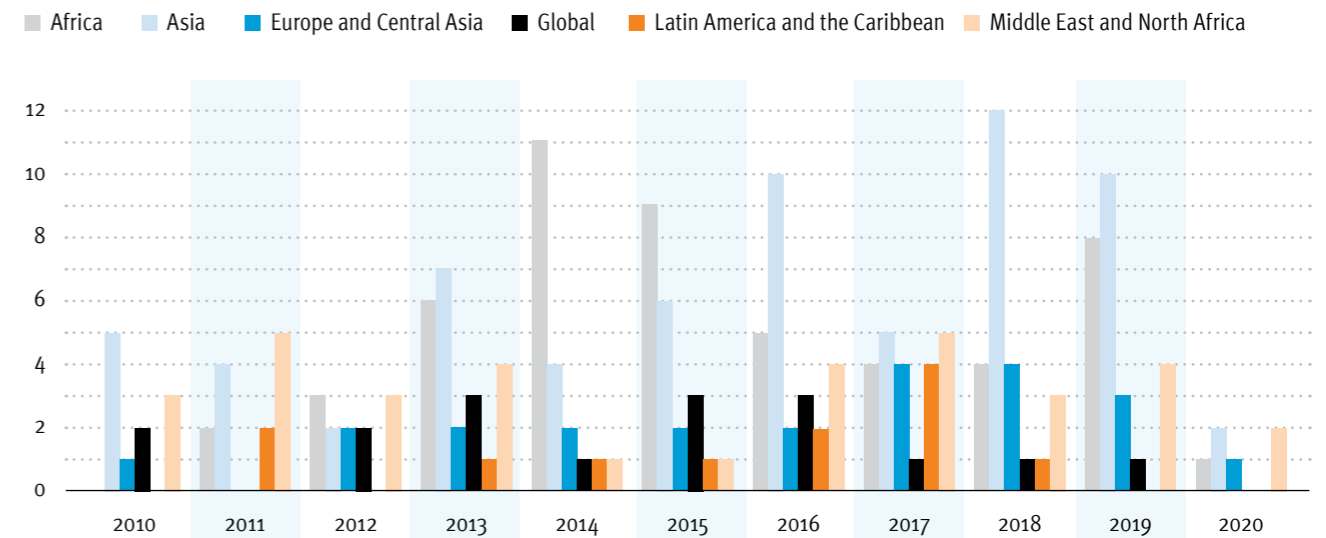


Source: Australian Bureau of Statistics, GeoNames, Microsoft, Navinfo, TomTom, Wikipedia; Powered by Bing

² A table with distribution of projects by country is available in Annex 2.

³ The total budget of each project was obtained from the UNIDO web systems or directly from the documents of the project evaluations. If the value was in a currency other than US Dollars, the yearly average exchange rate from the World Bank was used to convert the budget to current USD. To transform all current values of USD, to constant values of USD in 2012, the Implicit Price Deflators for Gross Domestic Product of the US Bureau of Economic Analysis was used.

Graph 4.2 Distribution of Projects by Region and Year



Source: Authors based on UNIDO project evaluations database

Table 4.1 Budget by year

Year	Total Budget in Constant 2012/USD	Average Budget per project in Constant 2012/USD	Min. of Budget in Constant 2012/USD	Max. of Budget in Constant 2012/USD
2010	\$ 23,427,478.47	\$ 1,952,289.87	\$ 158,235.76	\$ 4,605,532.10
2011	\$ 40,832,603.38	\$ 3,140,969.49	\$ 967,768.22	\$ 14,255,499.78
2012	\$ 80,924,174.66	\$ 6,743,681.22	\$ 264,700.00	\$ 55,420,476.00
2013	\$ 61,685,473.77	\$ 2,681,977.12	\$ 59,353.37	\$ 12,492,570.10
2014	\$ 54,517,666.13	\$ 2,725,883.31	\$ 189,090.63	\$ 10,660,923.84
2015	\$ 69,370,003.15	\$ 3,153,181.96	\$ 462,139.06	\$ 13,063,026.43
2016	\$ 63,584,140.34	\$ 2,445,543.86	\$ 383,930.40	\$ 13,941,539.63
2017	\$ 44,316,336.42	\$ 2,110,301.73	\$ 321,736.10	\$ 5,150,955.48
2018	\$ 85,791,696.05	\$ 3,431,667.84	\$ 376,785.02	\$ 12,396,382.38
2019	\$ 99,361,921.38	\$ 4,516,450.97	\$ 753,953.02	\$ 20,998,330.28
2020	\$ 13,639,637.30	\$ 2,273,272.88	\$ 721,327.26	\$ 3,985,630.19
Total	\$ 637,451,131.06	\$ 3,155,698.67	\$ 59,353.37	\$ 55,420,476.00

Source: Authors based on UNIDO project evaluations database

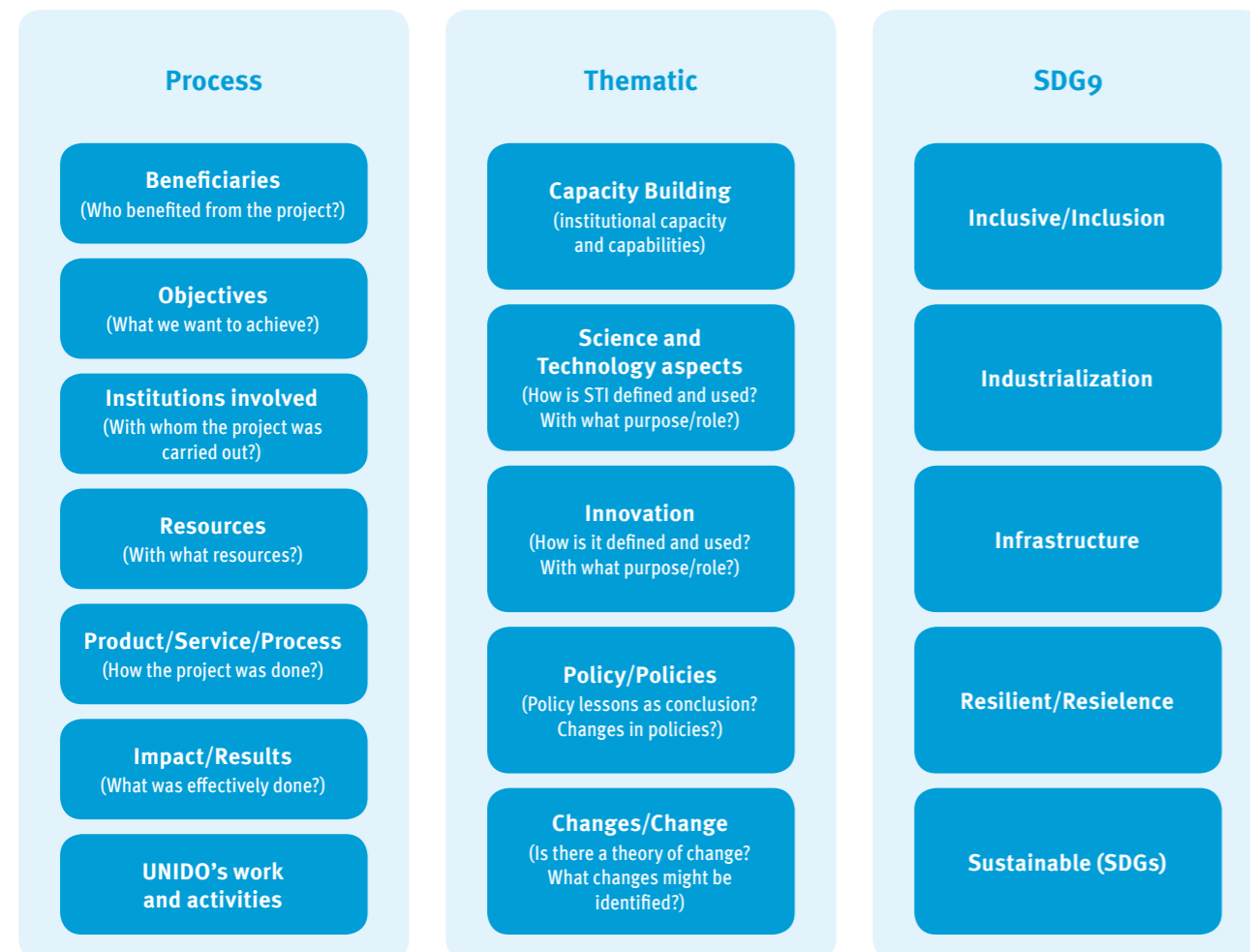
5. Qualitative Analysis of Projects

5.1. Analytical Framework

This section presents the content analysis performed on the documents of the database using NVivo12. Two analytical frameworks were applied to the data, one aiming to identify processes and the second to identify relevant themes for STI policies. In addition, a specific analysis

of UNIDO's work and the quantification of terms related to SDG9 was conducted to determine the concordance between UNIDO's work and the most important aspects of SDG9. A representation of these frameworks of analysis is presented in **Figure 5.1**.

Figure 5.1 Analytic Frameworks



The process framework focuses on traditional questions from impact evaluations. This analysis contributes to understanding how UNIDO's work is carried out in practice and allows us to compare it with the strategic framework of the institution. The analysis conducted by themes highlights how vital are these topics in the projects and activities that UNIDO carries out. It identifies workable definitions of the themes of Science and Technology, Innovation, Policy/Policies, and Change/Changes in the context of UNIDO's work.

Finally, a cross-analysis of topics was conducted to identify, for example, which part of the process of a project is

more relevant to the topic of innovation and SDGs. This cross-analysis will contribute to understanding the important factors in different aspects of UNIDO's work.

Overall, the analysis included 192 documents in English. Due to the high number of documents, the coding process started with a text search related to each area/theme and was later refined and checked. A list of the codes used, their description and the text search for each code, is presented in **Annex 3**. The following subsections present the main findings from the general analysis of these 192 documents with the different coding frameworks.

5.2. Coding by Process

The Process coding created seven codes (presented in **Figure 5.1**) and for each one of them a specific text search was conducted in the documents. For example, in the Impact code we searched for the words 'impact', 'result', and 'performance', and their stemmed words. The full list of text search for every code is in **Annex 3**. After coding for the different stages and actors relevant to a project's execution, it was possible to determine that most areas of the evaluation of projects were concerned with the role and work of UNIDO on them. This codification relates to

areas such as the divisions within UNIDO that oversaw the projects, the collaborations that UNIDO generated for the projects, and the main recommendations on how UNIDO should modify its interactions with counterparts in the projects to obtain better results, such as demanding more frequent reports or asking for a system of monitoring and evaluation with certain standards, etc. A chart identifying the relative importance of the codes is presented in **Figure 5.2**.

Figure 5.2 Hierarchical Distribution Chart of Process Coding

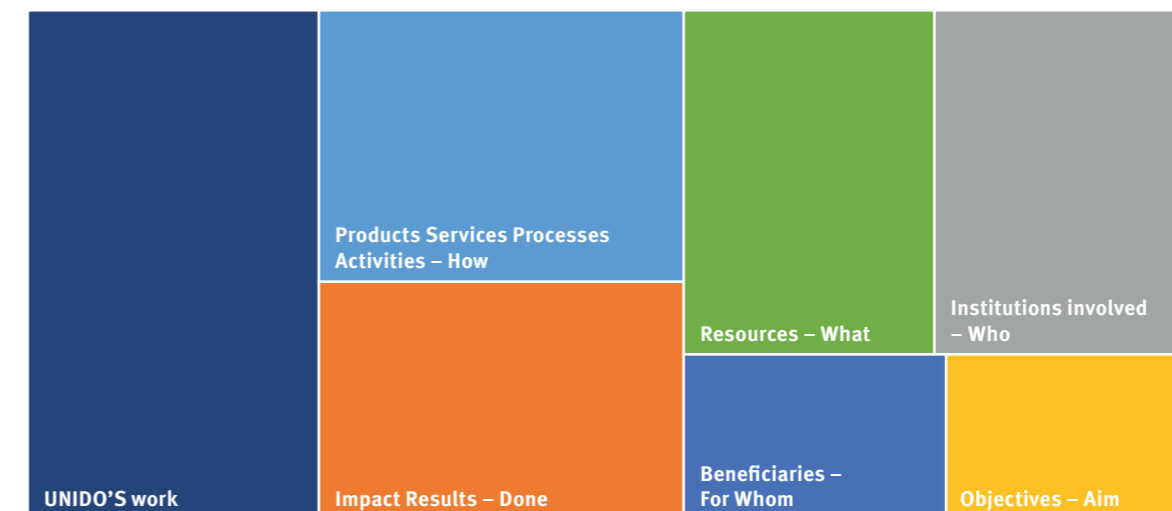


Figure 5.3 Most Common Words within the Process Codes



The most common terms within the text-coded sections (Figure 5.3) refer to activities necessary to implement a project, confirming the correct identification of the coded text. The most common words related to a project’s process are ‘management’, ‘activities’, ‘implementation’, ‘results’, ‘project’, ‘evaluation’, ‘impact’, ‘outcomes’, ‘objectives’, and ‘report’.

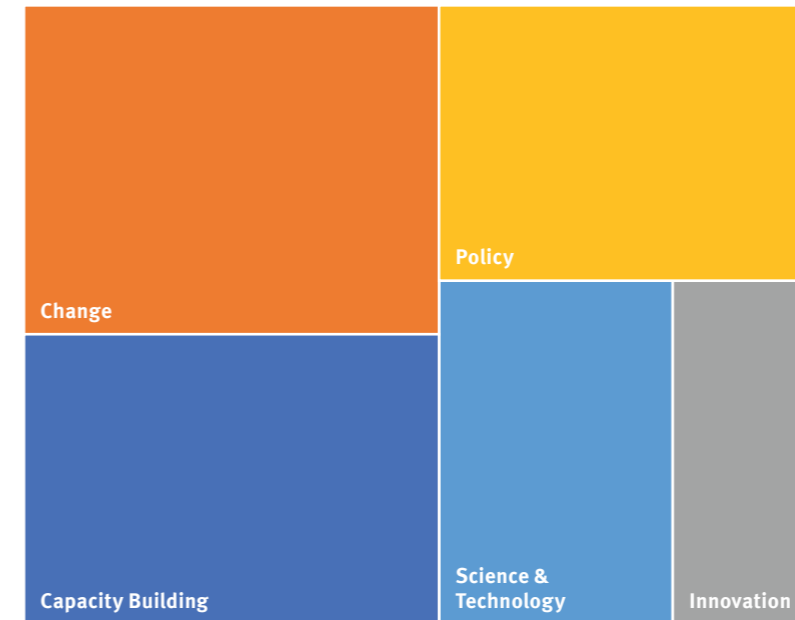
Some concepts deserve further consideration. For example, ‘development’, ‘training’, ‘energy’, ‘technical’, ‘services’, and ‘quality’ are words with a high frequency of appearance in the coded text. A cluster analysis of the most frequent words (see Annex 3) shows that except for the word ‘services’, the rest of the words are clustered together in a group that comprises the more technical aspects of a project and is more closely related to clusters associated to the implementation of a project.

5.3. Coding by Themes

The relevant themes identified (Figure 5.1) were translated in five codes. For the code of “Innovation” the text search was for the words ‘innova’ and ‘adopt’ and all their stemmed words. For the code of Science and Technology, the text search was ‘scien’ and ‘technolog’ and their stemmed words (for the full list of text search see Annex 3). The codes created by relevant themes and their relative weight measured by the number of mentions (Figure 5.4) reflect that the most relevant topics are change and capacity building. Within the topic of change, little more than half of the mentions are related to the projects’ expected changes, while the rest concern the actual changes observed. The coding for Policies follows in importance, followed by mentions of Science and Technology, and finally Innovation.

These basic results show the importance of these themes across a wide spectrum of projects conducted by UNIDO. It is possible to identify a large interest in the generation of capacities in different aspects of national systems of innovation (NSI) in member states in UNIDO’s projects. We can see the correlation between the themes to identify

Figure 5.4 Hierarchical Distribution Chart of Thematic Coding



Graph 5.1 Cross Analysis within Thematic Coding

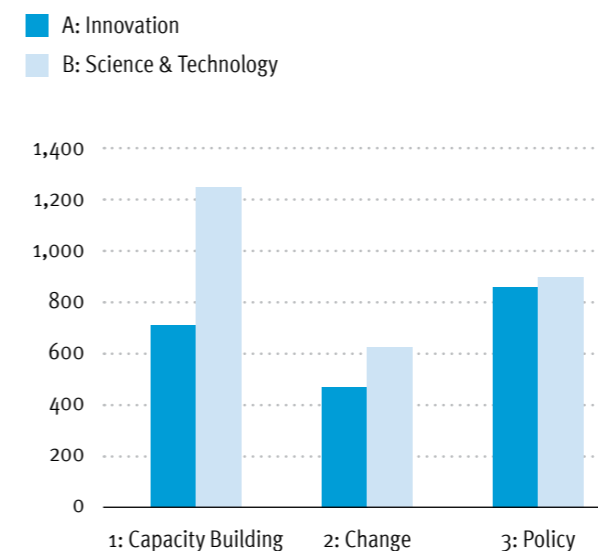


Figure 5.5 Most Common Words within the Thematic Codes



the relative importance of S&T and Innovation across the policies, changes and capacity building (Graph 5.1). It is possible to notice some differences. Capacity Building is more related to themes of S&T than Innovation. Regarding Change, there are more codes relating to change with S&T than with Innovation, but there are similar mentions for policy for S&T and Innovation. This brief exercise shows that UNIDO projects’ orientation has focused on creating local capacities related more to scientific and technological aspects within the NSI of member states than to generating innovation directly in some actors of the NSI.

The words more commonly found within these codes are shown in Figure 5.5. It is relevant to highlight that – excluding the words related to the process of projects – the words ‘development’, ‘capacity’, and ‘energy’ are within the most frequent, followed by ‘technologies’, ‘technology’, ‘technical’, ‘industrial’, ‘training’, ‘building’, ‘support’, ‘national’, and ‘policy’. This analysis shows the technical aspect of the themes coded, identifying a good match of the codes created.

5.5. Crossed Analyses Between Frameworks

Cross tabulations between the frameworks were obtained to understand better the relations between the analytic frameworks applied to code the documents.⁴ **Table 5.1** presents the cross-tabulation between Process codes and SDG9 codes. It is possible to observe that most of

the mentions of inclusive coding co-occur with mentions of UNIDO's work or activities conducted in the countries. Also, inclusiveness seems to be related to the results and impacts of the projects, as well as with the implementation processes and activities of the projects.

Table 5.1 Cross Tabulation of Process and SDG9 Codes

	Inclusive	Industrialisation	Infrastructure	Resilient	SDG
Beneficiaries – For Whom	106	24	120	81	1,273
Impact Results – Done	228	30	187	38	2,655
Institutions involved – Who	122	42	270	43	1,829
Objectives – Aim	87	28	97	22	890
Products Services Processes Activities – How	208	62	420	42	1,838
Resources – What	141	28	177	21	1,043
UNIDO's work	410	74	343	39	2,382

Industrialisation and infrastructure coding is more commonly found with references to UNIDO's activities, and the processes and activities conducted during the projects. Infrastructure is also related to the institutions involved in the projects, which can be related to the creation of new infrastructure and institutions for implementing the projects. Resilience and related terms are closely associated with the beneficiaries of the projects, which might indicate that it is a concept more closely used for final beneficiaries such as people, firms, entrepreneurs, etc. It seems that the idea of building resilient systems is less common in UNIDO's projects. Lastly, the coding related to sustainability and SDGs is more commonly found in text related to the impacts and results of the projects and the

activities done by UNIDO, which can identify a good focus of the work conducted.

Concerning the cross-tabulation between relevant themes and the processes of the projects, it is possible to observe from **Table 5.2** that Innovation is mainly related to the activities done by UNIDO and the products, processes, and activities involved during the projects, and to a lower extent, the impacts and results. Therefore, innovation in UNIDO's projects is found mostly on the projects' execution. It is interesting to highlight that the objectives of the projects are less related to mentions of innovation, signalling an indirect approach to innovation. This result is highly relevant for

the understanding of the role of innovation in UNIDO's contributions. It shows a higher emphasis on innovative processes during the execution of the projects than on innovative outcomes, which seems aligned with a lower importance of innovation in the objectives of the projects. In the case of S&T, we also found a high mention of these terms together with UNIDO's activities and the

process of execution of the projects, and then with the institutions involved. These results point towards a focus on generating S&T within and with the institutions in the countries involved in the projects, which can be related to the creation of S&T capabilities.

Table 5.2 Cross Tabulation of Process and Thematic Codes

	Capacity Building	Change	Innovation	Policy	Science & Technology
Beneficiaries – For Whom	1,005	847	346	693	597
Impact Results – Done	1,868	2,893	862	1,358	892
Institutions involved – Who	2,856	1,603	720	1,889	1,176
Objectives – Aim	852	1,160	319	904	445
Products Services Processes Activities – How	2,894	1,623	1,069	1,892	1,899
Resources – What	1,258	1,084	473	948	645
UNIDO's work	2,983	2,565	1217	2,907	1,803

As regards policies and capacity building, UNIDO's activities, projects' execution processes, and the institutions involved are also closely related. Most of the relevant themes identified are more related to the processes and the institutions involved in the projects than to the results, which could imply a somewhat indirect approach to innovation results. The coding for changes (expected and realised) is more associated with the results and with UNIDO's activities; and shows that actual changes are happening after the execution of projects.

Finally, the most relevant cross-tabulation is between the thematic codes and the SDG9 codes (**Table 5.3**), which are the relevant themes in this study. The SDG code is highly relevant in all the themes analysed but is highly related to the Capacity Building and Policy themes,

followed by Change. Therefore, we can hypothesise that sustainability is associated with creating capacities in the countries associated with S&T (mainly) and Innovation and with the generation or modification of policies to support these new capacities in the system, which generates change.

In addition, Capacity Building, Change, Innovation, and Policy are also correlated with Infrastructure and Inclusiveness, which can be interesting to study further. S&T is mostly related to infrastructure, and since before we identified that most Capacity Building coding was also correlated to S&T, we can begin to theorise that S&T is used in the generation of new institutions and infrastructure that increase the capacity of the systems in the countries where the interventions of UNIDO are executed.

⁴ These cross tabulations identify the number of occasions that the same text is coded in both nodes. However, since there are multiple codes that can co-exists, it is not possible to obtain a percentage, just an indication of how strongly two codes co-occur or an indication of correlation.

Table 5.3 Cross Tabulation of SDG9 and Thematic Codes

	Capacity Building	Change	Innovation	Policy	Science & Technology
Inclusive	147	164	94	149	76
Industrialisation	35	11	25	34	41
Infrastructure	343	86	69	183	104
Resilient	47	23	31	22	8
SDG	1,156	910	522	1,056	573

After this descriptive analysis of the coding conducted under the different frameworks, it was possible to start identifying some patterns emerging from the projects' evaluations.

- ▶ First, innovation and S&T are more present in the execution of the projects than in the design or the outcomes, indicating that the focus on these areas might be indirect.
- ▶ Second, the terms sustainable/sustainability and SDG are highly related to the activities done by UNIDO and the outcomes of its projects.
- ▶ Finally, there is a great importance of the Capacity Building term, associated highly to S&T, the activities executed in the projects, and the institutions involved, indicating a strong focus of UNIDO in the generation of capacities on S&T as part of its work and interventions.

The next section will present the in-depth analysis of some studies and will determine if the qualitative data support the hypotheses developed here.

6. In-depth Analysis of Selected Projects

In this section, the 23 projects selected for in-depth analysis are discussed. The same analytical framework from the previous section was used, exemplifying the main areas analysed in more detail. The analysis will

focus on the main themes of interest in this study: S&T, Innovation, and SDGs, and it will be integrated with the framework of the services that UNIDO can provide, discussed in Section 2.

6.1. S&T and UNIDO's interventions

The coding of S&T was done by searching any text with the root *scien** or *technolog**, therefore, including terms such as 'scientific', 'science', 'scientists', 'technology', 'technologies', 'technological', etc. These terms were found 915 times in the 23 documents (see Annex 3), and there were three projects with more mentions:

- ▶ Promoting Ultra low-head Micro Hydropower Technology to Increase Access to Renewable Energy for Productive Uses in Rural India" (97 mentions),
- ▶ "Climate change related technology transfer for Cambodia: Using agricultural residue biomass for sustainable energy solutions" (117 mentions), and
- ▶ "Overcoming policy, market and technological barriers to support technological innovation and south-south technology transfer: the pilot case of ethanol production from cassava" implemented in Thailand, Viet Nam and Lao PDR (176 mentions).

The three projects with more text coded in themes related to S&T are associated with technology transfer; hence, the importance of the technology coding.

According to the text coded, it is possible to decipher that S&T is mentioned usually in connection to adoption or transfer of existing technologies, or the generation of analysis or testing capacities in the member-countries, which are associated with generating scientific knowledge. For example, in the project "Identification, assessment, and prioritisation of pollution "hot spots" and transfer of environmen-

tally sound technologies (TEST) in the Cambodian section of the Mekong River basin", one of the objectives was "*the implementation of the TEST integrated approach in selected enterprises aimed at the improvement of the environmental performance in prioritized hot-spots while increasing their competitiveness through technological and knowledge transfers*" (p. 2). However, in the evaluation of the project it was noted that the role of UNIDO was not directly involved in the process of technology transfer: "It should be highlighted that UNIDO's support consisted in advice on rather than funding for technological upgrading" (p. 2).

In projects where the mention of S&T terms is very low, the projects are related to agri-business and their value chains, NCPCs, and small and medium-scale renewable energy projects. The few mentions of S&T terms are related to technology adoption of technology transfer or the obsolete technology used by firms in the countries. They are also mentioned in relation to institutions and organisations involved in the projects.

As discussed in Section 5.3, the terms related to S&T are usually correlated to capacity building and policy. In these 23 documents, S&T and Capacity Building happen to co-occur 185 times, while S&T and Policy co-occur 133 times, much higher than co-occurrence with change (69). Therefore, the activities of S&T conducted in UNIDO's projects seem to be more related to STS, as discussed in Section 2. A few examples and quotes from the documents

analysed are presented in **Table 6.5** (see **Annex 4** for a complete table of examples).

According to the STS classification (in **Table 2.1**), through the execution of projects UNIDO provides STS related to:

- (1) technical S&T support activities,
- (2) scientific data collection and analysis,
- (3) administration, management and funding of S&T,
- (4) analytical studies supporting S&T policymaking, and
- (5) preservation, interpretation, and dissemination of scientific information and knowledge.

It should be noticed that the role of UNIDO as an institution supporting S&T activities, rather than focusing on technology and innovation in companies, came from an institutional change in the late 90's. In the project "UNIDO Investment and Technology Promotion Office in Manama, Bahrain (ITPO Bahrain, 2017 – 2019)", it is stated that: "*The UNIDO 1997 Business Plan reoriented UNIDO's activities from supporting individual companies to institutional capacity building and policy advice*" (p. 5). Therefore, institutional orientations shape the effects and the type of interventions that the organization has in the countries.

Regarding technical S&T support activities, it was possible to identify that most of UNIDO's interventions include technical advisory services (A.1), supporting services of metrology and promoting the establishment of standards in different areas, such as pollutants' control or sanitary/phytosanitary standards for exporting goods (A.2), and supporting testing and quality control of goods, especially in the agricultural sector (A.3). These activities are mostly present in the projects related to the promotion of cleaner production, reduction of pollutants, trade, and global value chains.

The generation of scientific data collection and analysis is mostly done through the execution of surveys, prospecting and mapping conditions in a country, as well as monitoring and testing the environment. These types of activities are mostly present in the projects focusing on the promotion of cleaner production and reduction of pollutants. However, surveying is usually present in most evaluations of projects, therefore that data is also being generated by UNIDO, although it is not clear from the documents if this information is made publicly available for further analysis or comparisons.

Another highly relevant area for UNIDO is the support of policymaking, through the generation and dissemination of analytical studies supporting S&T policymaking. Most projects have impacts in this respect – as discussed in the previous section – generating new regulations or norms necessary to promote the changes that the projects aim to produce. Projects in the areas of promoting trade, new standards in agri-business, cleaner production, and technological upgrading and adoption in firms, are commonly generating these kinds of services.

The activities related to the administration, management, and funding of S&T, are generally concerned with the management and administration of centres supporting or conducting technical S&T activities, such as testing and monitoring of pollutants. Most of the projects with these services provided by UNIDO are focused on the promotion of cleaner production, reduction of pollutants, technology adoption and upgrade, trade and global value chains. In some of these projects UNIDO contributes to creating some of the administrative units that manage the programmes, like in the case of the "Tanzania Industrial Upgrading and Modernization Programme (TIUMP)".

The last point- preservation, interpretation, and dissemination of scientific information and knowledge -is a service that almost every UNIDO's project analysed promotes. These activities include disseminating knowledge from abroad related to the project and new knowledge generated within the projects. The target audiences are not only government officials, but also firms, and laboratories.

Two STS activities where UNIDO's presence is limited relate to Intellectual Property rights (IPRs) and routine socioeconomic data collection and analysis. In almost all projects, there was surveying relevant areas or potential beneficiaries mainly focused on generating a baseline of information, but these were not made systematic or on a regular basis, and it seemed that the data was not publicly available nor included in the countries statistics systems. It can be considered that the collection of data for the purpose of the projects or its evaluations can be another service or data to share with the relevant actors of the sector and country where the projects are executed.

Table 6.1 Examples of UNIDO's Interventions in Scientific and Technology Services (STS)

STS	Example	Source
A. Technical S&T support activities		
A.1 Engineering, architectural, environmental, other technical advisory services	The project document states that UNIDO will "stimulate and guide the local development of IT infrastructure through advice and consultation service, policy study and formulation." (p. x)	Shanghai International Information Technology Promotion Centre (SITPC). Enhancing IT Cooperation and Partnerships in the Asia-Pacific Region
	In Uganda, UNIDO "provided assistance to Chemiphar, a private laboratory and to the Ugandan Bureau of Standards (UNBS) microbiological and chemical laboratories for accreditation to ISO 17025 for microbiological and chemical analyses." (p. 8–9)	Trade capacity building in agro-industry products for the establishment and proof of compliance with international market requirements in the East African Community (EAC)
	"TIUMP ... aims to promote competitive industrial production and market access by private sector enterprises through among other interventions building the capacities of support institutions to deliver the appropriate services. At the enterprise level, the TIUMP provides the necessary training and advisory support on technology and business processes to improve the quality and quantity of industrial output. (p. 4)	Tanzania Industrial Upgrading and Modernization Programme (TIUMP)
A.2 Metrology, standards	Relevant activities included: "support to laboratories to obtaining accreditation and proficiency testing", "standard operating procedures and business plan for LibanPack.", and "a basic set of calibration equipment for market surveillance should be procured" (p. ix)	Increase Access to Export Markets for Lebanese Products and Improvement of its Quality Infrastructure to increase TBT SPS Compliance MACLE
	The project aims to "compliance of EAC products with formal standards of the EU and other markets." (p. 13) "In Tanzania, UNIDO projects funded supported the strengthening the metrology laboratory at the Tanzanian Bureau of Standards (TBS) as part of an upgrade of the national quality infrastructure." (p. 8)	Trade capacity building in agro-industry products for the establishment and proof of compliance with international market requirements in the East African Community (EAC)
A.3 Testing and quality control	"With its focus on the improvement of packaging testing, advisory services for packaging and labeling and on compliance with food safety requirements of key export markets (in particular traceability), MACLE was designed as a complementary effort to the more comprehensive EU quality programme (QUALEB)." (p. 6)	Increase Access to Export Markets for Lebanese Products and Improvement of its Quality Infrastructure to increase TBT SPS Compliance MACLE
	"Testing laboratories in all EAC countries have been provided with equipment to strengthen their capacity to provide conformity assessment services to exporters in line with international standards." (p. x)	Trade capacity building in agro-industry products for the establishment and proof of compliance with international market requirements in the East African Community (EAC)

STS	Example	Source
B. Scientific data collection and analysis		
B.1 Surveying, prospecting and mapping	“Surveys were undertaken and questionnaires released to collect data and information on some sources of unintentionally produced POPs in India” (p. 33)	Development of a National Implementation Plan in India as a First Step to Implement the Stockholm Convention on Persistent Organic Pollutants
B.2 Astronomical and geophysical monitoring, environmental testing	“A preliminary inventory of wastes and contaminated sites was established through questionnaires and field visits” (p. 33)	Development of a National Implementation Plan in India as a First Step to Implement the Stockholm Convention on Persistent Organic Pollutants
B.3 Routine socioeconomic data collection and analysis	No example found	
C. Governance, management and legal framework supporting S&T		
C.1 Administration, management, funding of S&T	“The Upgrading Unit Tanzania (UUT) project management unit was established from the onset of the Project.” ... “the UUT is equipped with the required managerial and operational skills and tools for the management and follow-up of the Industrial Upgrading and Modernization Programme in Tanzania (TIUMP).” (p. 32)	Tanzania Industrial Upgrading and Modernization Programme (TIUMP)
C.2 Intellectual property protection	No example found	
C.3 Analytical studies supporting S&T policymaking	“The NCPC Centre has influenced policy makers to introduce CP policies and some amendments to the Environment Act of the country favourable to promote CP technologies.” (p. 6)	UNIDO – National Cleaner Production Centre, Sri Lanka
	“In Uganda the UNIDO project ‘Integrated Programmed Support to agro-processing industries’ supported a co-ordinated approach to developing national food safety policy including preparing a National Food Safety bill and the National Food Safety Strategic Plan.” (p. 8)	Trade capacity building in agro-industry products for the establishment and proof of compliance with international market requirements in the East African Community (EAC)
	“Implicitly, one of the objectives of the TIUMP is to hand over to the Government a tool of Industrial Policy to improve economic competitiveness (UUT, Methodology, technical centres)” (p. 5)	Tanzania Industrial Upgrading and Modernization Programme (TIUMP)

STS	Example	Source
D. Preservation, interpretation and dissemination of scientific information and knowledge		
D.1 Preservation, interpretation and dissemination of S&T related knowledge	“Five workshops discussed technical aspects with relevant stakeholders such as private sector representatives of SMEs, industrial and agricultural associations, academic institutions, testing laboratories, public institutions and Government bodies.” (p. 26)	Development of a National Implementation Plan in India as a First Step to Implement the Stockholm Convention on Persistent Organic Pollutants
	“Being a key activity area under the Project, different approaches such as: lectures; seminars; information dissemination through leaflets, posters, books, manuals, and website; exhibitions; and annual CP Award ceremonies have been used.” (p. 8)	UNIDO – National Cleaner Production Centre, Sri Lanka
	In this project one of the activities was a “workshop on open data and knowledge environments for innovative research and development.” (p. 21)	Shanghai International Information Technology Promotion Centre (SITPC). Enhancing IT Cooperation and Partnerships in the Asia-Pacific Region
D.2 Publishing and translating of S&T books, journals and other forms of printed and electronic publications	“A video has been produced for the widely dissemination of the pilot projects” (p. ix)	Promoting market-based development of small to medium- scale renewable energy systems in Cape Verde
	“The Office had also been able to efficiently contribute to UNIDO’s normative function by disseminating knowledge and has provided platforms such as the virtual innovation and entrepreneurship hub for the exchange of knowledge and experience on many issues, often beyond the investment and technology theme but clearly related to UNIDO’s mandate and strategic priorities.” (p. 24)	UNIDO Investment and Technology Promotion Office in Manama, Bahrain (ITPO Bahrain, 2017-2019)
	“A website to disseminate relevant information on SPS trade issues was also completed and linked to the EACB website.” (p. 45)	Trade capacity building in agro-industry products for the establishment and proof of compliance with international market requirements in the East African Community (EAC)

Source: Authors based on UNIDO project evaluations database

With respect to IPRs, it seems that since most projects focus on technology adoption or upgrading, but not necessarily in the generation of new technologies locally, the IPR system could seem less relevant for UNIDO’s work. In fact, there were only nine mentions of “intellectual property rights” in five documents, and only in one of them the term was related to an outcome of the project. In “Climate change related technology transfer for Cambodia: Using agricultural residue biomass for sustainable energy solutions,” it is mentioned that output 2.1 of the

project included training of 20 experts in areas related to technology transfer and “*capacity building related to intellectual property rights (IPR), patents and trade secret regimes*” (p. 15). In the other mentions, IPRs are a frame to consider in the implementation of the programs, or a topic discussed between organizations and countries involved in the projects. The relative low importance of IPR protection within UNIDO’s projects should be reconsidered; since in certain Global Value Chains (GVC) or technology adoption projects the strength of the IPR systems in the host

countries of technologies suppliers is a relevant factor that can determine the inclusion of firms in foreign markets.

The analysis of UNIDO's interventions with a focus on the theme of Science & Technology allows us to identify that most of the projects provide services and activities related to S&T. The main S&T activities and services that UNIDO provides are:

- (1) technical support, like testing, metrology, generation or adoption of standards, or technical advice,
- (2) scientific data collection and analysis of surveys and environmental testing,

6.2. Characterizing innovation in UNIDO's interventions

There are only 305 mentions of the term 'innovation' (search terms: Innova* OR adopt*) within the 23 documents analysed in this section. Given the definition of innovation and the different types of innovations presented in Section 2, most innovations are considered which only involve the firms or the private sector. However, we need to make a clarification on who can innovate within a project, since OECD and EUROSTAT (2018) acknowledge the possibility to identify innovation in the public sector, which may be inclusive of the agencies or centres involved in UNIDO's projects. Most of this innovation is on processes and can involve UNIDO as a relevant actor. Likewise, necessary is to distinguish between innovation as expected outcomes of a project versus innovation as part of the activities underpinning the execution of projects. Both types of innovation can occur in a project, but the actor that carries out the innovation could change. For example, innovation as an outcome can be related to innovation in the beneficiaries of the projects, while innovation in the execution of the project can be found in the institutions that contribute to the realisation of the project such as government agencies, actors in the private sector, laboratories, universities, or in UNIDO.

Noteworthy is the absence of the word 'innovation' and its stemmed words in some documents; for example, in "UNIDO – National Cleaner Production Centre, Sri Lanka". Another example is the project "Overcoming policy,

- (3) administration and management of programmes that promote S&T,
- (4) generation and dissemination of analytical studies supporting S&T policymaking, and
- (5) dissemination of information and knowledge from abroad and generated in the projects.

However, there are two areas that we found to be less relevant on the projects: routinised data collection and analysis, and IPRs protection. These areas could be analysed further in a future study to identify if there is scope to include them in UNIDO's interventions and how to do it.

market and technological barriers to support technological innovation and south-south technology transfer: the pilot case of ethanol production from cassava", where there is no other mention of innovation besides the title. In other projects, there are only two or three mentions that are related to the adoption of technologies or refer to expected outcomes or future changes in the programmes, and in only one project, it was possible to find a definition of innovation: "Innovation: adapting products and processes to win new markets" (Edible Oil Value Chain Enhancement Joint Programme, p. 6).

Most of the mentions of the word 'innovation' are found in one of the expected outcomes or aims of the projects. For example, in the project "UNIDO Investment and Technology Promotion Office in Manama, Bahrain (ITPO Bahrain, 2017 – 2019)", it is explicitly stated that "Output 2.4 Organize and/or participate in technology exhibitions to promote innovative and sustainable technologies to potential beneficiaries and facilitate match-making" (p. 61). However, in the evaluation of the programme and the effective outcomes found, there is no explicit mention of the rate or number of beneficiaries that adopted or created innovative technologies. It is possible to observe an indirect focus on innovation in the project and that it will be a subproduct of the activities performed in it. This indirect approach to innovation seems to occur in most of the 23 projects analysed, but it should be studied further with a larger sample.

Notable exceptions were found in three projects. In the project, "Identification, assessment and prioritisation of pollution "hot spots" and transfer of environmentally sound technologies (TEST) in the Cambodian Section of the Mekong River basin", where one of the expected outcomes was *Innovative approaches implemented at the enterprise level to decrease in the concentration and/or volume of the selected enterprises' discharges and increase of their profitability* (p. 36). Innovation in other projects was even more concrete. In "Promoting Renewable Energy Based Mini Grids for Productive Uses in Rural Areas in the Gambia", one of the results was itself innovative: "The project installed two re-conditioned 450 kVA wind turbine at Solifor in Tanji along the coast in August 2012. The pilot project is innovative and is the first wind farm in West Africa that used refurbished wind turbines. Besides it provided technical cooperation to develop the Power Purchase Agreement documents which were not available in the country before the project" (p. 11). In the third project, "Africa (Accelerated) Agribusiness and Agro industries Development Initiative (3ADI)", the innovation came from the coordinated efforts of three international agencies working together in an innovative way: "The other major outcome of the taskforce is a Technical Assistance Facility (3ADI TAF) concept jointly developed by UNIDO, FAO and AfDB. Through this innovative Facility, the three organizations intend to broker greater coordination between private investment including Agvance Africa Fund and public investment projects run by the Governments, development financial institutions and other donors" (p. 109).

In most of the projects studied here, UNIDO aims to increase innovation in firms and institutions of Member States mainly through the adoption of technologies or standards from abroad, in which the demonstration effect from pilot projects is crucial. For example:

- ▶ Independent Terminal Evaluation Promoting Renewable Energy Based Mini Grids for Productive Uses in Rural Areas in the Gambia: "The project seeks to address most of the existing barriers to the wide scale adoption of renewable energy technologies in The Gambia through an integrated and catalytic approach that combines interventions aimed at creating a market environment conducive to investments in renewable

energy projects and pilot projects aimed at demonstrating technical feasibility and commercial viability of renewable energy projects. It is envisaged that these interventions, seen together, will catalyse greater investments in renewable energy projects in the Gambia and provide useful lessons in the region" (p. 33).

- ▶ Trade capacity building in agro-industry products for the establishment and proof of compliance with international market requirements in the East African Community (EAC): "The expected outcome at the regional level is: Outcome 1: At the regional level, SPS Protocol is adopted, and standards and conformity assessment procedures for selected agroproducts are harmonized" (p. 3). The expected impacts included "Increase in adoption of food safety standards by export food business enterprises" (p. 60).
- ▶ Capacity strengthening and technical assistance for the implementation of the Stockholm Convention (SC) National Implementation Plans (NIPs) in African Least Developed Countries (LDCs) of the ECOWAS sub-region: "One of the key components of the projects was technology transfer at the pilot sites for paper, plastic and lube oil recycling, healthcare waste management, and alternative approaches to the use of pesticides in agriculture in order to reduce PCDD/F releases and risk of exposure to POPs pesticides. As this was done through a pilot approach, it is vital that the results and lessons of these pilot demonstration projects are summarized and shared to other regions and countries for adoption, replication and / or upscaling. To create an atmosphere conducive for this, it is important that appropriate mechanisms / systems for incentives and support are in place in the LDCs, which would contribute to convince private sectors, and other key stakeholders to embark in these replication and / or upscaling efforts" (p. 6).
- ▶ Edible Oil Value Chain Enhancement Joint Programme: The programme "worked to showcase development of an efficient oil seed value chain that would promote entrepreneurship, provide capital and services to farmers, raise demand for agricultural products and connect farmers with markets, addressing the pro-

duction, handling, processing, marketing and distribution of oil seeds. Through the JP it was anticipated that employment and income would be generated, and that the productivity and quality of oil seeds and edible oil production would be enhanced. The process was intended to lead to increased food security and innovation throughout the value chain” (p. 1).

- ▶ Promoting Ultra low-head Micro Hydropower Technology to Increase Access to Renewable Energy for Productive Uses in Rural India: “Given the relevance of micro hydropower technology, it is foreseen that this intervention will guide a pathway to increase the number of people with access to sustainable energy and to promote innovative technologies with the prospect of delivering long-term green growth and jobs for the benefit of local communities” (p. 60).

In some cases, there were positive effects in the private sector. In the project, “Capacity strengthening and technical assistance for the implementation of the Stockholm Convention (SC) National Implementation Plans (NIPs) in African Least Developed Countries (LDCs) of the ECOWAS sub-region”, *the companies selected for the pilot demonstration projects invested significantly to adopt and implement BAT/BEP. For example, the Global Technology and Industry of Mali (GTIM), a company involved in the recycling of lube oil, invested about USD50,000 to improve on safety at its premises and to get the ISO 14001 certification. Similarly, on recommendation of the project Sodioplast, a plastic recycling company located in Conakry, Guinea, invested USD 100,000 for the mechanization on its three sorting centers* (p. 6). However, other outputs in the project did not achieve the anticipated results, like the adoption of bio-pesticides for planters and growers. The result was unsatisfactory because the promotion of bio-pesticides was not based on well-known products that have been implemented in other Asian countries.

An important finding is that UNIDO itself has made innovations to underpin project implementation processes. In “Identification, assessment and prioritization of pollution “hot spots” and transfer of environmentally sound technologies (TEST) in the Cambodian Section of the Mekong River basin”, it is stated that “*The combination of the Hot*

Spot and TEST approach for a first project phase in the field of “resource efficient and clean production” is innovative and allows for systematically focusing on the major polluters within a country, in order to achieve a maximum impact.” (p. 26)

The same can be concluded from the project “Tanzania Industrial Upgrading and Modernization Programme (TIUMP)”: “*As far as coordination and complementarity are concerned the TIUMP was innovative in that it integrated UNIDO’s Upgrading and Networking approaches (Cluster approach of BIT’s Cluster and Business Linkage (PTC/BIT/CBL))*” (p. xiii). Another example is the approach to capacity building adopted by the project, “Increased Access to Export Markets for Lebanese Products and Improvement of its Quality Infrastructure to increase TBT SPS Compliance MACLE”, which was an “*Innovative way of expanding Trade Capacity Building (TCB) approach beyond traditional understanding of “compete and connect” by including marketing related issues*” (p. xi).

In “Upgrading the Medicinal and Aromatic Plant Value Chain – Access to Export Markets (EMAP)”, it was stated that: “*UNIDO conducted a thorough analysis of the MAP sector and operationalized the Project through a well-managed inception phase. At the time of the design in 2010, the combination of a value chain with a trade corridor approach was innovative. The Project covered the entire value chain and identified/attempted to address all key challenges within the chain comprehensively in cooperation with partners where needed. Neither did UNIDO limit the scope of the value chain analysis areas of its core expertise only nor was the value chain analysis used to justify the provision of services out of UNIDO’s standard toolbox.*” (p. 28). The evaluators highlighted that it was an “*innovative value chain approach in trade capacity building that addresses weaknesses within the chain comprehensively*” (p. xi).

Another example is the “UNIDO Investment and Technology Promotion Office in Manama, Bahrain (ITPO Bahrain, 2017 – 2019)”, where “*The Enterprise Development and Investment Promotion Programme (EDIP) is an innovative approach that is applied by the ITPO Bahrain to investment promotion and can be seen as a response to*

existing conditions of scarcity of local entrepreneurs and the absence of cohesive entrepreneurial support services. The EDIP programme has two main components: Enterprise Creation and Enterprise Growth. A third component aims to develop institutional capacity, at national level, to handle these two elements as well as to build up strong networks to ensure the programme’s long-term sustainability” (p. 12). An example of an innovative outcome of the ITPO Bahrain is the “*Virtual Innovation and Entrepreneurship Hub (in www.e-entrepreneurs.org) developed jointly with Intel Corporation in the US will be made accessible to the ITPO Network Offices*” (p. 6), which the evaluation suggested that it should be adopted by other ITPOs.

Finally, in the project “Africa (Accelerated) Agribusiness and Agro industries Development Initiative (3ADI)”, the evaluators noticed that “*rather than following a traditional technical assistance (TA) project approach, the 3ADI support was to look at the broader picture and involve a different way of working: not “UNIDO alone” but together with other UN agencies and with banks/development finance institutions. This was based on the underlying vision that standard TA was not enough and that investment was also needed to address the challenges at stake with respect to agricultural transformation and food security.*” (p. 51) This innovative way of working for UNIDO and coordinating with other international agencies was crucial to creating an innovative institution, the Technical Assistance Facility (3ADI TAF), as mentioned above.

As a conclusion of the role of UNIDO’s interventions in the innovation process of firms in the Member States, it seems that from the beginning, it has focused its efforts on promoting technological adoption and upgrading, but mainly indirectly. UNIDO’s efforts seem concentrated in generating or strengthening local institutions to promote innovation in firms. The most active participation in firms’ innovation is done through pilot projects in some of UNIDO’s interventions to generate demonstration effects.

However, in most of these cases it is not UNIDO itself financing these projects but collaboratively with new or previous institutions on ground.

It is possible to contrast these findings on innovation with the classification of firms’ innovation activities presented in section 2. Hence, one can identify more closely the ways UNIDO interventions may have a sway over firms’ innovation. Most of these seem to focus on “activities relating to acquisition or lease of tangible assets,” which are the main activities conducted when adopting new technologies for the firm. Also, it might be that UNIDO’s interventions promote “marketing and brand equity” activities on firms; since, in some cases, the objectives of the interventions include the generation of new markets or the access of firms to foreign markets. Given that the process of innovation in firms requires multiple activities, UNIDO’s interventions might also influence “employee training” and generate new “innovation management activities” on the firms; however, these areas are not directly mentioned in the documents.

Furthermore, the focus of UNIDO’s intervention on technology adoption emphasises one innovation capability of firms: the “ability to design, develop and adopt technological tools and data resources.” As noted above, other innovation capabilities and activities are relevant for the successful adoption of technologies in firms, but from the qualitative analysis conducted, it seems that UNIDO does not purposefully target these other areas.

An interesting finding was to identify how innovative is UNIDO’s work. The institution’s flexibility seems a key factor for generating innovations in the way projects are executed and conducted. It could be hypothesized that this flexibility allows the projects to adapt to local conditions; however, it is more difficult to assess success or failure factors because of the absence of a frame of reference to compare projects between countries.

6.3. SDGs and UNIDO's interventions

UNIDO's mission is actively related to SDG9 since this goal is the only one directly related to industrialization and innovation, and UNIDO is the leading organization of the UN system focusing on Inclusive Sustainable Industrial Development (ISID). However, the four pillars of the work conducted by UNIDO, as presented in section 2, make its work relevant for other SDGs such as SDG1, SDG5, SDG8, SDG10, SDG12, SDG13, and SDG14.

After analysing the coding of SDG in the 23 documents, from which 15 are from 2015 onwards, when SDGs were adopted, there are two considerations:

- (1) most of the text referring to sustainability is associated to the evaluation of the project's sustainability itself; and
- (2) there are very few explicit mentions of the terms SDG or SDG9. The text search for the SDG code was sustaina*

OR SDG OR SDG9, and its result showed that the term 'sustainable' and 'sustainability' were the most frequent. However, these two terms were related to the analysis of the project evaluations, where the sustainability of the project itself was the main concern. Generally, the term 'sustainability' appeared in the text related to the probability of the institutions involved in the project to maintain the intervention or its outcomes and impacts in the long run without UNIDO's involvement. Sustainability was seldom related to beneficiaries or impacts of the projects.

Within the 23 documents, there are only 14 unique mentions after eliminating repetitions of the terms SDG, "sustainable development goal," and "development goal". There are only two mentions of SDG9 within these documents. These quotes are presented in Table 6.3.

Table 6.2 Coded Text Related to SDGs

Coded Text	Source
... "the Project's objectives directly contribute to Millennium Development Goal (MDG) 7 (environmental sustainability) ¹⁰ . More indirectly, project objectives potentially also contribute to MDG 1 (eradicating extreme hunger and poverty). More productive and competitive industries are more likely to create jobs and pay higher salaries, which in Cambodia are important as supplementary incomes for rural workers. A competitive industry potentially contributes to the creation of employment, higher salaries and increases of tax revenues, which both have a direct link to poverty reduction." (p. 8)	Identification, assessment and prioritization of pollution "hot spots" and transfer of environmentally sound technologies (TEST) in the Cambodian Section of the Mekong River basin
"The project objective and development goal are also in line with Norway's overall development cooperation objectives which include support to developing countries to achieve sustainable economic development and create an enabling business environment for the purpose. It is also in accordance with NORAD's policy of channelling funding through multilateral organizations with project management experience like UNIDO to achieve these objectives. NORAD and UNIDO have a long history of cooperation in this area." (p. 36)	Trade capacity building in agro-industry products for the establishment and proof of compliance with international market requirements in the East African Community (EAC)
"The project is also aligned to the UNIDO thematic priorities, particularly: Poverty reduction through productive activities – Environment and Energy. In addition, the project is also in alignment with and will contribute towards Sustainable Development Goals on Energy (SDG 7), which aims to 'ensure access to affordable, reliable, sustainable and modern energy for all'." (p. 14)	Mini-grids based on small hydropower sources to augment rural electrification in Tanzania

Coded Text	Source
The development goal of the project is to "contribute to sustainable reduction in poverty through the promotion of agri-business in low-income countries". (p. 46)	Africa (Accelerated) Agribusiness and Agro industries Development Initiative (3ADI)
"The project addresses issues related to SDG 8 (Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all), SDG 9 (Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation), SDG 17 (Strengthen the means of implementation and revitalize the global partnership for sustainable development) and falls in line with UNIDO's vision of Inclusive and Sustainable Industrial Development – ISID." (p. 42)	UNIDO Investment and Technology Promotion Office in Manama, Bahrain (ITPO BAHRAIN, 2017 – 2019)
"The ITPO office in Bahrain strives to achieve the above 4 outcomes. In doing so, it provides feedback to governments to modernize their legislation, organizes events where interested parties can meet and create synergies, travels extensively to be at the forefront of technological advances and match requests and offerings on a global scale and last but not least provide a unified environment where an ecosystem of financial institutions, academic institutions, entrepreneurs, business associations, NGOs etc. can all work together to achieve these 4 outcomes under the Sustainable Development Goals of the United Nations as well as the priorities of the local governments." (p. v–vi)	
"Ultimately, all ITPO Bahrain interventions target the UN Sustainable Development Goals and each event is identified as promoting one or several such SDGs." (p. 7)	
"ITPO Bahrain's interventions are in line with UNIDO priorities and the latest United Nations Sustainable Development Goals." (p. 18)	
"Gender mainstreaming is a key Sustainable Development Goal of the United Nations (SDG5: Gender Equality). It has received a lot of attention from ITPO Bahrain and the government in general. Promoting women entrepreneurs is an integral component of the ITPO Bahrain's work programme." (p. 25)	
"The project is also aligned to the UNIDO thematic priorities, particularly: • Poverty reduction through productive activities • Environment and Energy The project is also in alignment with and will contribute towards Sustainable Development Goals on Energy (SDG 7), which aims to "ensure access to affordable, reliable, sustainable and modern energy for all". (p. 35)	Promoting Ultra low-head Micro Hydropower Technology to Increase Access to Renewable Energy for Productive Uses in Rural India
In the Annex of Terms of references: "Impact and sustainability (i) Identification of actual or potential long term developmental changes or benefits (economic, environmental, social and developmental) that have occurred or are likely to occur as a result of the project (ii) Actual and potential benefits in terms of achieving development goals (iii) The prospects for institutional sustainability of the SITPC" (p.32)	Shanghai International Information Technology Promotion Centre (SITPC). Enhancing IT Cooperation and Partnerships in the Asia-Pacific Region

Coded Text	Source
“CP addresses productivity, environmental and social imperatives in parallel. The project objectives directly contribute to Millennium Development Goal (MDG 7) (environmental sustainability) and more indirectly to MDG 1 (eradicating extreme hunger and poverty).” (p. 15)	Independent Ex-post Evaluation UNIDO Support to the National Cleaner Production Centre in Viet Nam
“At the broader development level, the project directly contributes to the realisation of the Sustainable Development Goals, particularly SDG 7 (ensuring sustainable energy), SDG 9 (building resilient infrastructure) SDG 10 (reducing inequality), SDG 11 (making human settlement resilient and sustainable), SDG 13 (combatting climate change), SDG 15 (halting land and forest degradation) and SDG 17 (strengthening global partnership). Given that UNIDO is mainly spearheading SDG Goal 9, the project is highly relevant for the wider objectives of UNIDO.” (p. 14)	Promoting renewable energy-based grids in rural communities for productive uses in Côte d’Ivoire
The programme “The process was intended to lead to increased food security and innovation throughout the value chain, increasing the income of farmers, processors and traders, and in so doing, addressing three MDGs: Goal 1 – poverty reduction, Goal 3 – gender equity improvement, Goal 7 – sustainable development.” (p. 1)	Edible Oil Value Chain Enhancement Joint Programme

Source: Authors based on UNIDO project evaluations database

Focusing on the project with more frequent reference to SDGs and with more outcomes related to SDGs, the “UNIDO Investment and Technology Promotion Office in Manama, Bahrain (ITPO Bahrain, 2017 – 2019)”, it is possible to understand better that its objectives of generating new firms and supporting technology adoption in the firms are associated to SDGs, in particular SDG8, SDG9 and SDG17.

“The main purpose of this project is to mobilize domestic and foreign investments, thereby contributing to job creation in Bahrain, the Arab Region and in developing countries. This will be achieved by providing support, added value and advisory services to existing and potential entrepreneurs as well as by identifying and mobilizing financial, technological, and other resources required for the establishment of business partnerships and for enterprise growth and creation through the Enterprise Development and Investment Promotion (EDIP) Programme. The project will also identify opportunities for foreign and domestic investors and technology suppliers to find potential partners. The project

addresses issues related to SDG 8 (Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all), SDG 9 (Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation), SDG 17 (Strengthen the means of implementation and revitalize the global partnership for sustainable development) and falls in line with UNIDO’s vision of “Inclusive and Sustainable Industrial Development – ISID” (p. 42).

Interestingly, the joint work conducted by the ITPO with the Supreme Council for Women (SCW) of Bahrain highlights the effective contributions of the project as related to SDG5.

The “Supreme Council for Women ... was established on 22 August 2001 and directly reports to His Majesty the King. The ET met with Ms. Deena Rashed Al Khalifa, Director General for Policies and Development. The relationship with UNIDO is twofold, policy advice

and technical knowledge. Ms. Al Khalifa stressed the long collaboration between the SCW and UNIDO, which helped them develop their strategy and to run economic empowerment programmes. Together, they organized entrepreneurship workshops. The SCW drafts recommendations and policies relevant to women and prepares the national strategy for women. UNIDO plays a consultative role in SCW’s activities and provides an international perspective and best practices. They rely on UNIDO’s expertise and the international exposure. The SCW national plan is aligned with national priorities and the SDGs. They consider UNIDO as a “source and an ally” and have new plans on innovation and technology through education to assure sustainability. Ms. Al Khalifa indicated that women graduates constitute 67%, but they are not equally represented in the labour market even though equal pay for equal work is written in the Constitution of Bahrain.” (p. 26)

For the project “Promoting renewable energy-based grids in rural communities for productive uses in Côte d’Ivoire,” when linking its aims with the SDGs that are related to the project, it is possible to understand that giving the implementation of the project in small communities there are more linkages to SDGs related to civil society, such as SDG10 and SDG11.

“The project thus specifically aimed at i) creating a critical mass of skilled and knowledgeable technicians and public officers; ii) building awareness, especially of the private sector, about the appropriate technologies and best practices; iii) linking energy services with productive uses; and, iv) formulating and strengthening policies encouraging the involvement of the private sector and promote providing access to innovative and smart financial mechanisms. The project aimed at realising these objectives through three main Project Components (PCs): Component 1: institutional, policy and financial mechanisms; Component 2: identification

of resources and preparation of feasibility studies; and, Component 3: technology demonstration and creation of awareness and technical capacities” (p. 7).

“At the broader development level, the project directly contributes to the realisation of the Sustainable Development Goals, particularly SDG 7 (ensuring sustainable energy), SDG 9 (building resilient infrastructure) SDG 10 (reducing inequality), SDG 11 (making human settlement resilient and sustainable), SDG 13 (combatting climate change), SDG 15 (halting land and forest degradation) and SDG 17 (strengthening global partnership). Given that UNIDO is mainly spearheading SDG Goal 9, the project is highly relevant for the wider objectives of UNIDO.” (p. 14)

In conclusion, the four strategic priorities for UNIDO (Creating shared prosperity, Advancing economic competitiveness, Safeguarding the environment, and Strengthening knowledge and institutions) are related to several SDGs beyond SDG9 and UNIDO’s mission; other development goals are highly relevant for the institution. Notably, SDG7, SDG13, and SDG15 can be highly related to all UNIDO’s projects, focusing on Safeguarding the environment. The SDG5, SDG10, and SDG11 are more related to the strategic priority of Creating shared prosperity. SDG8 and SDG9 are more linked with the Advancing economic competitiveness priority. And lastly, SDG9 and SDG17 can be more linked to Strengthening knowledge and institutions priority.

However, while the relationship between the objectives of UNIDO’s work with SDGs seem more straightforward, they are not necessarily reflected in the projects’ evaluations. There are no mentions of these terms in the analysis of the outcomes of the projects, nor is there a discussion on how effectively UNIDO is contributing to SDGs in each project with concrete indicators. This might be a topic for further discussion in the institution and in future studies.

7. Discussion and suggested way forward

7.1. Discussion

From the analysis of the projects presented above, some questions emerge about the relationships between the projects executed, the role of science, technology, and innovation in those projects, and the advancement of the SDGs in the Member States of UNIDO. To understand the relationship between all these aspects, it is important to state that the local conditions and capacities of the governments determine the effects of the interventions. In particular, the concept of the National Systems of Innovation (NSI) might be helpful to understand the inter-relationships between actors and the environment, and the potential outcomes that the changes in the innovation policy mix can generate at the system level.

Innovation policies are a mix of horizontal and vertical initiatives, focusing on increasing the demand or generating more supply for innovation to occur. They can also focus on improving coordination and technology transfer from the supply-side to the demand-side actors. The innovation policy mix differs across countries and is shaped by a country's policy goal or multiple policy goals, and shape the framework conditions of a NSI (Meissner and Kergroach, 2021). Multilateral initiatives such as the United Nation's SDGs can shape the policy objectives of a country, and finally, they can modify the innovation policy mix.

The initial conception that science and innovation would lead – almost automatically – to economic growth and development has been contested with the outcomes of that paradigm, in which inequality, poverty, and environmental degradation have been deepened through the years globally. Given these societal problems, there has been a change in innovation policies' demands, broadening their scope and aim. The SDGs can shape political

priorities, promoting innovation to contribute to SDGs. In this respect, UNIDO's framework (see Section 2) linking interventions to promote ISID, is precisely in the right direction connecting intervention on STI with sustainable development that can, in the long run, affect SDGs and countries' growth. However, from the results presented in section 6, it was not possible to find a clear trajectory from UNIDO's interventions, to STI, to ISID, to SDGs.

The analysis in this study identified that the outcomes and purpose of the projects are aligned with promoting changes on STS and innovation, and with SDGs, but the evaluations did not measure indicators in this respect since they are indirect outcomes. The time lag between the execution of the projects, the evaluation of the projects and the identification of long-term indirect impact is not usually considered in UNIDO project evaluations. Also, even when there are specific indicators for long-term impact, if the evaluation fails to find a significant impact, it most probably will be due to the timeframe of the evaluation.

To consider is precisely the systemic nature of the outcomes and impact of the projects. The impact of the interventions depends on local conditions, capabilities, and the characteristics of the NSI. The long-term impacts of projects are usually dependent on the activities of other institutions and actors of the NSI that are path-dependent and do not necessary change because of UNIDO's interventions. However, from the analysis it was possible to identify that UNIDO's interventions do have a systemic impact. Two examples are the "Independent Terminal evaluation of UNIDO Investment and Technology Promotion Office in Manama, Bahrain (ITPO Bahrain, 2017 – 2019)" and "Identification, assessment and prioritization of pollution "hot spots" and transfer of environmentally

sound technologies (TEST) in the Cambodian Section of the Mekong River basin" (see **Box 1** and **Box 2**). These examples illustrate that the areas of capacity building and – in some projects – the generation of new agencies and actors can dramatically change the innovation system in a country, and sometimes in a region – as in the case of ITPO Bahrain. UNIDO's interventions act at the local level but can result in changes at the systemic-level, either

national (NSI), regional NSI (Regional Innovation System), and in some cases, affect Sectoral System of Innovation as well – as exemplified by interventions in the energy sector. Unfortunately, it was not possible to obtain information on how this impact was achieved, and to assess the relative importance of UNIDO's contribution. UNIDO could consider developing indicators to link clearly, trajectory of interventions to different levels of impact.

Box 1: Independent Terminal evaluation of UNIDO Investment and Technology Promotion Office in Manama, Bahrain (ITPO Bahrain, 2017 – 2019).

The ITPO in Bahrain was established in 1996 by an Agreement, signed in 1995 between the Government of Bahrain and UNIDO. The Government Implementing Agency is the Bahraini Ministry of Finance. Its mandate is to mobilize resources (finance, technology, know-how, managerial) from Bahrain and the Arab region to developing countries and economies in transition. In parallel, ITPO Bahrain has also developed the EDIP (Entrepreneurship Development and Investment Promotion) Programme, which aims at stimulating the emergence of new and growth of existing enterprises that produce goods and services for trade, provide employment and income for people, and thereby contribute to poverty alleviation and overall economic growth. They developed the ITPO EDIP Virtual Innovation and Entrepreneurship Hub portal (www.e-entrepreneurs.org) jointly with Intel Corporation in the US and it is accessible to the ITPO Network Offices.

ITPO Bahrain is well connected in the country and the region, providing services in other countries, such as Egypt, Nigeria, Saudi Arabia, Sudan and Morocco among others.

All ITPO Bahrain interventions target the UN Sustainable Development Goals and each event is identified as promoting one or several such SDGs, mainly SDGs 5, 8, 9, and 17. It has four expected outcomes:

1. Increase technology transfer of sustainable technologies and increase FDI
2. Improve knowledge and skills of investment/technology
3. Develop and strengthen linkages with financial institutions
4. Promotion of new technologies to promote a more diversified economy with less dependence of oil production

It also provides services such as feedback to governments to modernize their legislation, organizes events where interested parties can meet and create synergies, and provide a unified environment where an ecosystem of financial institutions, academic institutions, entrepreneurs, business associations, NGOs etc. can all work together to achieve the 4

outcomes expected under the SDGs and the priorities of the local governments. Some specific services provided are:

1. Implementation of EDIP and develop domestic investment and attract foreign direct investment.
2. Assistance to entrepreneurs through collective preparation and empowerment, counselling and technology tie-ups/development of full-fledged joint ventures, business plan preparation and financial linkages.
3. Source financial support and linkages for SMEs through the various financial schemes available in Bahrain and the region.
4. Promote investment and technology transfer through the ITPO Network.
5. Assist existing enterprises in upgrading/growth by assessing their needs and defining the appropriate interventions through counselling and business advice to create a sound basis for the attraction of foreign direct investments.

It has generated over USD600m in investments in SMEs, for a USD4.2m budget. It has promoted more than 4,400 projects of SMEs, from which about 3,000 are from Bahrain and 1,400 are from other countries in the region. It has effectively concluded 1,191 projects that have provided jobs for 5,585 persons. The evaluation also indicates that there are several women entrepreneurs that have been beneficiaries of the EDIP programme, however, there is no indicator or effective share of women entrepreneurs participating to assess the importance of gender.

The evaluation does highlight that ITPO Bahrain has effectively generated relations with different actors of the entrepreneurial ecosystem in the region, generating an "investment ecosystem" that might generate sustainability to the office and the project in the future.

The ITPO Bahrain is a relevant case of a project generating a new actor in a NSI, promoting systemic changes, contributing to generating entrepreneurial capacities in the countries, and promoting investment in SMEs and new firms contributing to a diversification of the economy and generating new jobs.

Box 2: Identification, assessment and prioritization of pollution “hot spots” and transfer of environmentally sound technologies (TEST) in the Cambodian Section of the Mekong River basin.

The project was implemented between 2011 and 2013 by the Ministry of Industry, Mines and Energy (MIME) of Cambodia. Its objective was to “reduce the industrial discharge into river systems and improve the water quality of the Mekong River”. To implement it, UNIDO combined two methodological approaches: the “Hot Spot” and the “TEST” methodologies. The “Hot Spot” methodology consists of identifying the main polluting sites or firms discharging pollutants into the river by testing and surveying companies. From this approach, fifteen companies were prioritised to implement the TEST methodology. The TEST methodology integrated two approaches simultaneously: reduce the environmental pollution while increasing firms’ competitiveness by technological and knowledge transfers. The TEST approach introduced management tools (Environmental Management Accounting – ISO 14051, Environmental Management System – ISO 14001, and Corporate Social Responsibility – ISO 26000). It also introduced the “Resource Efficient and Cleaner Production (RECP)” methodology at the production level to identify technologies that could be adopted to reduce pollutants in the production process.

The combination of these two methodologies was innovative for UNIDO’s work and proved to be successful. The evaluation highlighted that “UNIDO’s support consisted in advice on rather than funding for technological upgrading”. The main conclusions of the evaluation were:

1. The objectives were aligned with national priorities and with the Millennium Development Goals.
2. Nine companies directly benefited from the project and the TEST approach.
3. These companies invested USD200,000 in the adoption of clean technologies, improving their competitiveness and reducing their environmental impact of production.
4. The nine beneficiary companies implemented 380 RECP changes, that resulted on 400,000 m³ of water and 5 million Kwh of electricity savings. Savings were the main motivator for firms deciding to apply and invest in cleaner production technologies.
5. The project management at the country and the head-

quarters was considered best practice and a role model. The high managerial and technical skills of the staff and fluent communication between the project office and headquarters were crucial.

6. The project included the procurement of portable laboratory equipment to the Industrial Laboratory Centre of Cambodia to contribute to the identification of pollutant spots and the enforcement of environmental norms.
7. Training in the TEST methodology was conducted for 27 specialists.
8. There was an absence of environmental norms and testing capacities in the public sector to effectively enforce norms and standards. UNIDO should promote these changes in the countries to stimulate cleaner industrial production.
9. MIME adopted the TEST approach to implement it in its industrial development policies and applied it in other firms and sectors as in the industrial fabric.

These results reveal the important impact of UNIDO’s intervention at the systemic level. Even when environmental norms and their enforcement should be implemented, there is a change in the country’s industrial policy including the TEST approach to evaluate the production process and its environmental impact on other firms and sectors. Also, the equipment procured to the Industrial Laboratory Center increase its testing capabilities and promotes the enforcement of norms and standards.

Another relevant systemic change is the effect of the TEST approach in firms, changing the managerial perspective on the benefits of cleaner production and the adoption of cleaner technologies. Firms were willing to invest in cleaner production motivated by a reduction in costs and the increases in competitiveness that this might entail in their value chains. Overall, there are systemic changes occurring on the country that are not presented in this perspective. This project also highlights the innovative nature of UNIDO’s interventions, since the combination of the “Hot Spots” and TEST methodologies was new and showed to be highly effective.

In addition, since the meta-analysis conducted in this study builds on evaluated projects, there is potentially a sample bias towards large projects, which, as per UNIDO regulations, are subject to allocate resources and undertake dedicated project evaluations. Hence, relatively small projects focused on concrete STI aspects and affect the NSI may drop out of the survey. Though small, those projects may provide useful information about UNIDO’s work on STI, ISID, NSI, and SDGs. As part of the consultations

to elicit feedback on this report, a list of projects related to the surveying national systems of innovation undertaken as part of UNIDO’s technical cooperation activities were identified as relevant examples (Table 7.1). These projects fall within the time frame considered for this review and are clearly targeting the countries’ NSI and specific economic sectors. A dedicated evaluation could be conducted on these and similar projects in a subsequent phase of this review.

Table 7.1 Examples of Smaller Projects Related to NSI

Project scope	Countries covered	Sector/industry
Survey of National System of Innovation	Ghana, Kenya, Cabo Verde, Moldova	N/A
Innovation Surveys based on Frascati and Oslo Manual	India	Automotive sector, Paper and Pulp, Cement, Bicycles
Survey of the National System of Innovation and Innovation Survey combined	India	N/A

As a recommendation, UNIDO might continue working on generating a clear traceable path and indicators from specific projects to its large objectives such as contributing to ISID and SDGs on Member States. For example, it is possible to understand a chain of outcomes and impact from the interventions towards long-term goals as presented in Figure 7.1. In this exercise, UNIDO needs to clarify better the external factors that might influence the impact of its projects in the long run; in particular,

if these factors are related to actors, institutions, policies, and norms of the countries. UNIDO might have the ability to influence changes on those factors that contribute to systemic changes on the NSI and relevant sectors. This is clearer from interventions where UNIDO promotes the adoption of international standards, the establishment of policies or the creation of new institutions for compliance with international norms.

Figure 7.1 From Interventions to Sustainable Growth



Based on the preceding discussion, it is possible to propose new studies or evaluations at to shed light on the relationship between particular interventions and the

achievement of long-term objectives of UNIDO. These studies can be a relevant input to clarify the path of outcomes and impact of UNIDO interventions.

7.2. Further Studies

Several questions emerge from the qualitative analysis conducted on the project evaluations of UNIDO over the period 2010 to 2020. Addressing such questions might provide additional evidence to understand the core of UNIDO’s work and interventions, as they relate to the broad STI field. This section will discuss three areas in which, we believe, interesting results can inform UNIDO about its work and its impact on Innovation, S&T and SDGs.

Relationship of UNIDO’s interventions with firms’ innovation

From the study of the concept of innovation in the 23 documents analysed in-depth, the conclusion is that UNIDO fosters innovation of firms through the adoption of technologies or the adoption of standards, expecting to increase the quality of products, sales and exports. This concept of innovation seems adequate considering

that most of UNIDO's interventions are carried out in low and middle-income countries. A question in this respect is if this approach to innovation is more suitable for the realisation of the organization's mission to promote ISID. However, the focus of UNIDO on technology transfer and adoption can be seen as a distinctive factor.

In UNIDO's projects, only a few firms effectively innovate during the project implementation because the work of UNIDO consists mainly of demonstration effects through pilot projects. The assumption is that this proof of concept would then spark further actions and scale up by the governments and the private sector of Member States, hence there is continuity in the intervention. However, an important factor for this demonstration effect to generate spill-overs and impacts on other firms in the economy is the capacities of the governmental agencies involved, the private sector, and their connections, i. e., these depend on the capacities of the National System of Innovation of each country. Even when UNIDO's interventions have a focus on strengthening these capacities, it is not evident from the projects' evaluations that the local systems of innovation have increased these capacities in the long run, and, therefore, that can promote a real effect on the country's firms after the end of the interventions.

Given these two findings, we can propose to do two future studies that can highlight potential changes in UNIDO's intervention regarding innovation: the one is strategic, and the other is to study the effects of UNIDO intervention in an aggregate manner, different from Thematic Evaluations. The first study should have a more strategic focus and analyse the potential demand for change from UNIDO's Member States. It should help understand how this can be operationalised internally in the organisation leading to changes in the design and execution of the projects, including specific indicators and expected outcomes. Moreover, it could be studied if there is an intention within UNIDO to impact innovation more specifically in firms and if it is relevant for the organization to have specific outcomes and impact indicators in this area. The analysis done in this study shows that UNIDO's influence on innovation in firms is mostly an indirect effect of UNIDO's projects. Most projects had at least one direct and clear outcome related to innovation in firms, but our analysis

suggests that project evaluations seldom address this issue or provide dedicated indicators to monitor the progress in this dimension.

The second proposed study could consist of a meta-assessment focusing specifically on innovation effects of UNIDO's interventions. This study could rely on mixed methods and might focus on a country and/or an economic sector, studying all UNIDO's interventions in this specific country/sector and how the firms' innovative activities and outputs have changed, with a long-term horizon for the evaluation of results. These types of studies are different from Thematic Evaluations because they do not focus on studying the same type of projects in different countries, but rather focus on different interventions that were executed in different years but all in the same economic sector and/or country. The integrating factor for all those interventions would be the promotion of innovation. Such an exercise could be carried out as part of UNIDO's Country Programmes, and Partnership Country Programmes.

Methodologically, these studies can have two approaches. First, if there are enough impact evaluations of projects, with data available and indicators related to the expected outcomes, a meta-analysis of these evaluations can be conducted. For example, the Independent Evaluation Unit of the United Nations Office on Drugs and Crime, has used this methodology to generate general conclusion from its projects' evaluations (UNODC, 2017). The second alternative can be to implement a mixed-method approach, to understand the effect of UNIDO's intervention in the innovation of firms in a specific sector/country. In this case, it might be difficult to determine the impact of UNIDO's interventions since there are multiple interventions from other institutions or governments happening at the same time. To try to isolate UNIDO's effect, in-depth interviews with relevant actors in the sector/country could contribute to weight the effects of the programs and projects in the long-term, even in a timeframe longer than the ones used in impact evaluations of projects. The qualitative analysis can be complemented with quantitative analysis of longitudinal data, such as data coming from innovation surveys. With this data, panel dynamic simultaneous equations models can be estimated to determine if there was a structural change in the sector/country after the intervention.

Relationship of UNIDO's interventions with S&T

As presented above, most of UNIDO's projects relate to Capacity Building and Science and Technology, but from the provision of Science and Technology Services (STS). An important aspect of the projects is that most of them promote policy changes and the adoption of international standards by local authorities and firms. All the examples presented in section 6 show this orientation in the projects, indicating that there might be an impact of UNIDO's interventions at the system level. Therefore, it could be possible to assess the effect of UNIDO's projects in Systems of Innovation at the national, regional or sectoral level. However, so far, the approach to project evaluations seems to have missed opportunities to deploy this kind of systemic approaches.

Most interventions' objectives concentrate on solving market failures, reducing systemic failures, and generating new institutions or actors within the innovation systems. However, there is not a clear outcome in the design of the projects directly associated to systemic level transformations.

To address this issue, it should be possible to conduct a comprehensive and long-term evaluation of the effect of UNIDO's work on a country/sector/region's innovation system, analysing secondary data and interviews with key actors. Again, impact evaluations at the innovation system level have not been conducted in a systematic way (Molas-Gallart and Davies, 2006; Borrás and Laatsit, 2019, Porta, 2019) and there are no methodologies to follow, since there are multiple variables shaping and affecting a social system. Arnold (2004) proposes to do different multi-level analysis, and for the meso level analysis to focus on general indicators and their evolutions. Porta (2019) proposes to move to complexity theory to find a more suitable methodology. However, the issue of impact evaluation of innovation systems is not resolved, especially since it is more probable to monitor its evolution or changes, but it is very difficult to compare with a counterfactual method, especially at the national level. Therefore, the methodologies proposed here are by no means exhaustive and only represent a suggestion of the authors, and do not intend to evaluate the impact of UNIDO's interventions on innovation systems, but rather to understand long-term effects in a more aggregated way.

Mixed-method approaches would be useful to identify the contributions of different interventions happening simultaneously, trying to isolate the effects of UNIDO's interventions vis à vis other international institutions and local governments' initiatives. This identification can be better done with expert's appreciation during interviews, asking them to compare different interventions and approaches between institutions. In addition, quantitative analyses are necessary to identifying potential structural changes in the systems that UNIDO's interventions might have contributed to. These should be based on secondary data from National Institutes of Statistics, innovation and manufacture/industry surveys, and surveys on particular sectors, such as energy, agriculture, etc. The data needs to provide information on certain relevant variables, such as those related to absorptive capacities in firms, testing capacities in centres, enforcement of norms from the public sector, etc. Unfortunately, the readiness to conduct this type of study depends on the institutions' capacities to generate data and how mature the statistic system is in a country. Without data, the task of doing a meta-study at the level of Innovation Systems is impossible.

Relationship of UNIDO's interventions with the SDGs

The in-depth analysis conducted in this study suggest the somewhat limited mention of the SDGs, particularly SDG9, as guiding objectives for UNIDO's projects. Given the importance of SDGs in the mission and work of UNIDO, this result brings to the fore three issues that could be addressed in future studies.

Project evaluations could be designed in ways that help to understand better outcomes stemming from UNIDO projects as they relate to the achievement of SDGs in the Member States. To do this, it is necessary to discuss how to leverage on UNIDO's projects to inform practical recommendations on how to evaluate projects based on SDG metrics or indicators, or to measure their effect in the short timeframe of the execution of the projects or their evaluations. Interviews with UNIDO's officers are relevant to understand these issues and if it makes sense to include outcomes on SDGs in UNIDO's projects and how to evaluate them more specifically. It will also be interesting to systematically document how the organisation works

with Member States to achieve the objectives of the SDGs. Specifically, the processes involved in the operations of a project, determination of its outcomes, and if or how the discussion of SDGs is present in these processes. These questions and topics of interest should be evaluated further in future research. A qualitative study with interviews with managers, counterparts, and officers from the evaluation office could be helpful to understand the relevant role of SDGs in the design of projects, that has translated insufficiently into project execution or evaluation. If this is the case, the study can inform of the difficulties in operationalizing the SDGs in UNIDO's projects and propose some avenues to solve this issue.

A dedicated Thematic Evaluation is recommended to understand the linkages between the projects executed, their effects on Science, Technology, and Innovation in the sectors/countries intervened, and their effects on the consecution of SDGs. Such Thematic Evaluation could aggregate different projects related to a similar SDG, for example SDG7 or SDG13. In this type of evaluation, not only qualitative analysis of documents and interviews can inform of policy and systemic changes in the countries

where the projects were executed, but also it could be used to generate data on the indicators proposed by the UN regarding the SDGs and to test for structural changes in those sectors or countries. Given that UNIDO has in place a systematic approach and methodologies for doing Thematic Evaluations, this type of evaluations focusing on SDGs can be relatively easy to include in its periodic evaluations. The methodology should follow the Thematic Evaluation done of UNIDO's contributions to MDGs in 2012, including additional survey and data collection to identify effects and outcomes of UNIDO's projects after their closure.

Unfortunately, most of the recommendations given in that Thematic Evaluation seem still valid today for the projects of UNIDO and their impact on SDGs. One of the most pertinent recommendations was to identify the relevant SDGs aligned with UNIDO's mandate and integrate their targets and indicators into its own results framework, but it is unclear that this has happened, at least not on the 23 documents analysed in-depth nor is there mention of this alignment of projects outcomes and SDGs indicators.

8. Conclusion

UNIDO is the single agency within the UN system with the specific mandate to promote inclusive and sustainable industrial development and innovation in its Member States. This mission is highly correlated with the SDGs and, in particular, with the SDG9. However, since the adoption of the Addis Ababa Action Agenda (AAAA) and the 2030 Agenda for Sustainable Development in the UN in 2015, it was clear that coordination between multiple UN organisations should facilitate effective actions related to STI to the achievement of SDGs (UNIDO, 2018).

This report aims to contribute to the discussion with new data and analysis, based on qualitative analysis of UNIDO's project evaluations from 2010 to 2020. In total, 207 documents were analysed using content analysis and text search, and from those, 23 documents were selected to conduct an in-depth content analysis. While recognizing possible limitations from this study, we believe there is value in that this is a first attempt at collecting evidence that could inform the development of a strategic framework around UNIDO's work in STI, and its translation in actual projects executed by the Organization.

The results of the analysis can be summarised in the following main conclusions:

- 1 UNIDO interventions contribute mainly to the provision or improvement of Science and Technology Services in the sectors and countries where the institution works.
- 2 UNIDO promotes innovation by fostering technology transfer and technology adoption in firms.
- 3 Innovation in firms is not directly promoted. The use of demonstrative effects of pilot projects is central in UNIDO's activities, and it is expected that the projects will result in positive spill-overs to other firms.
- 4 While UNIDO's work is strongly aligned with SDG9, its interventions are relevant for many other SDGs, in particular SDG5, SDG7, SDG8, SDG10, SDG12, SDG13 and SDG17.
- 5 Even when the design of UNIDO's interventions are aligned with SDGs and SDG9, it is still difficult to establish the pathways from projects to outcomes and impact towards the achievement of SDGs.
- 6 There is significant room to better identify UNIDO's contribution in STI and SDGs, and to effectively assess and determine the pertinence of its interventions based on its mandate around ISID.

From these results, a set of further studies and lines of research are suggested. These studies can inform UNIDO of its interventions' effects on dimensions not yet evaluated. They can also contribute to a better understanding of the institution's work within STI and to differentiate them relative to other organizations with a mandate on STI and industrial development. We propose the following studies:

- 1 To study the demand from Member States for UNIDO interventions to promote innovation in their countries. Strategically, this study can contribute to outline changes in the design and execution of the projects, and to specify indicators and expected outcomes.
- 2 To study the long-term effects of all UNIDO's interventions in innovation within a country/sector selected.

3 To study UNIDO's effect on local STS activities and their effects on Innovation Systems at different levels: national, regional, or sectoral.

4 To study the relation and use of SDGs in the projects' Theory of Change and its outcomes, proposing specific indicators associated to the outcomes of the projects for future project evaluations.

5 To study, in an aggregate manner, different projects associated to a specific SDG and determine effects on the indicators associated to it in the countries affected by UNIDO's intervention in this area, following a similar methodology and approach of UNIDO's Thematic Evaluations.

Even when these studies can contribute to better understanding the effect of UNIDO on the Innovation Systems of countries, the timeframe of the evaluations and the length of the interventions should be considered carefully. Hence, it would be more likely to identify any potential relationship between UNIDO projects and systemic changes in a longer timeframe period. The evidence available for this study was insufficient to characterize a pathway of impact, from projects to changes in the STI system of Member States, or how project implementation contribute to efforts towards the achievement of SDGs and ISID. Additional studies can contribute to make these two distinct relationships clearer.

Our analysis likewise documented the difficulty to establish the connection of project outcomes with the STI-ISID-SDGs outcome chains. There is no clear trajectory, from projects to STI, to ISID, to SDGs, and how the interventions are creating change according to UNIDO's mission. To better connect the projects' outcomes with UNIDO's mandate, it is suggested that evaluations of projects might include a section analysing the outcomes of the projects regarding Innovation, S&T, ISID and SDGs. Alternatively, UNIDO can conduct the studies suggested here on specific countries/sectors with respect to Innovation, S&T, ISID and SDGs at regular long-term intervals; for example, every 5 to 10 years. Both approaches can contribute with relevant new knowledge, but the latter approach can help to understand better the impact of all UNIDO's programmes and assess how the available battery of interventions is accomplishing the organisation's mission.

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A.1. Annex 1: Definitions of Innovation

Table A.1.1. Innovation objectives and outcomes for measurement, by area of influence

Innovation objectives	Outcome Indicators
Markets for the firm's products	Upgrade goods or services Expand the range of goods or services Create new markets Enter new markets or adapt existing products to new markets Increase or maintain market share Increase the reputation, brand awareness, or visibility of goods or services Comply with market regulations Adopt standards and accreditation
Production and delivery	Upgrade outdated process technology or methods Improve the quality of goods or services Improve flexibility for producing goods or services Increase speed of producing goods or delivering services Reduce labor costs per unit of output Reduce material, energy costs or operating costs per unit of output Reduce time to market
Business organization	Improve capabilities for absorbing, processing and analyzing knowledge Improve sharing or transfer of knowledge with other organizations Improve the efficiency or function of the firm's value chain Improve communication within the firm Improve or develop new relationships with external entities (other firms, universities, etc.) Increase business resilience and adaptability to change Improve working conditions, health or safety of the firm's personnel Implement a new business model Contribute to the development of standards
Economy, society or environment	Reduce negative environmental impacts /deliver environmental benefits Improve public health, safety or security Improve social inclusion Improve gender equality Improve the quality of life or well-being Comply with mandatory regulations Comply with voluntary standards

Source: OECD and Eurostat (2018, 166)

The contextual nature of innovation brings to the fore issues of capability building, multi-stakeholder relations and their interactions, the importance of institutions and policy dialogues, learning and experimentation. Based on UNIDO (2018), we looked at UNIDO's contribution to build-

ing four types of capabilities underpinning the innovation performance of firms as proposed in OECD and Eurostat (2018, Chapter 5). **Table A.1.2** presents a rough description of these activities.

Table A.1.21. Innovation capabilities of firms

Capabilities	Characterization
Resources controlled by a firm	These generally refer to as firm characteristics in terms of age, size, assets, financing and ownership structure.
General management capabilities	These include a unit's competitive strategy and the organizational and managerial capabilities used to implement, monitor and achieve the goals of such strategy. A relevant aspect is the presence of explicit strategies to manage and appropriate intellectual property.
Skills of the workforce and the firm's human resources management practices	It includes workforce qualifications, occupational structure and competencies. This category includes human resource management practices to mobilize those resources as part of innovation processes.
Ability to design, develop and adopt technological tools and data resources	Three types are of particular interest: (1) technical expertise, (2) design capabilities and (3) capabilities related to digital technologies and data analytics.

Source: OECD and Eurostat (2018, Chapter 5)

A.2. Annex 2: Descriptive Statistics of Projects

Table A.2.1 Distribution of documents included in the analysis by year

	Year											Total
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Project Evaluations	11	13	12	23	20	22	26	23	25	26	6	207
Thematic Evaluation	12	2	2	6	2	6	3	5	1	1	0	40
Total	23	15	14	29	22	28	29	28	26	27	6	247

Source: Authors based on UNIDO project evaluations database

Table A.2.2 Distribution of projects by thematic priority

Thematic Priority	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Advancing Economic Competitiveness				1		1	4	7	7	7	3	30
Advancing Human Security in Post Crisis Situation		1										1
Creating Shared Prosperity			1	1	2	1	3	4	1		1	14
Energy and Environment	1	2	3	7	3							16
GB1 Exec Direct & Strat Mngt							1					1
Investment and technology promotion	1											1
Other/Executive Board/ South – South cooperation			1									1
Poverty Reduction through Productive Activities	5	3	2	6	3							19
Poverty Reduction through Productive Activities (Post Crisis)	2	1	2	3	4							12
Private Sector Development				1								1
Safeguarding the Environment				1	4	20	18	12	17	19	2	93
Trade Capacity Building	2	6	3	3	4							18
Total	11	13	12	23	20	22	26	23	25	26	6	207

Source: Authors based on UNIDO project evaluations database

Table A.2.3 Distribution of projects by region

Region	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Africa		2	3	6	11	9	5	4	4	8	1	53
Asia	5	4	2	7	4	6	10	5	12	10	2	67
Europe and Central Asia	1		2	2	2	2	2	4	4	3	1	23
Global	2		2	3	1	3	3	1	1	1		17
Latin America and the Caribbean		2		1	1	1	2	4	1			12
Middle East and North Africa	3	5	3	4	1	1	4	5	3	4	2	35
Total	11	13	12	23	20	22	26	23	25	26	6	207

Source: Authors based on UNIDO project evaluations database

Table A.2.4 Selected Projects for in-depth analysis

Evaluation Name	Region	Country	Year	UNIDO thematic priority	Thematic Evaluation or Topic
Shanghai International Information Technology Promotion Centre (SITPC). Enhancing IT Cooperation and Partnerships in the Asia-Pacific Region	Asia	China	2010	Investment and technology promotion	Independent Thematic Evaluation UNIDO Investment Technology Promotion Offices' Network
Increase Access to Export Markets for Lebanese Products and Improvement of its Quality Infrastructure to increase TBT SPS Compliance MACLE	Middle east and North Africa	Lebanon	2010	Poverty Reduction through Productive Activities (Post Crisis)	Thematic Evaluation of UNIDOS Projects related to Industrial Upgrading
Trade capacity building in agro-industry products for the establishment and proof of compliance with international market requirements in the East African Community (EAC)	Africa	Kenya, Tanzania and Uganda	2011	Trade Capacity Building	Independent Thematic Evaluation UNIDO's work in the area of Persistent Organic Pollutants (POPs)
Development of a National Implementation Plan in India as a First Step to Implement the Stockholm Convention on Persistent Organic Pollutants	Asia	India	2011	Safeguarding the Environment	Independent Thematic Evaluation UNIDO's work in the area of Persistent Organic Pollutants (POPs)
Independent Ex-post Evaluation UNIDO Support to the National Cleaner Production Centre in Viet Nam	Asia	Viet Nam	2012	Energy and Environment	Topic: NCPC National Cleaner Production Centre

Evaluation Name	Region	Country	Year	UNIDO thematic priority	Thematic Evaluation or Topic
Edible Oil Value Chain Enhancement Joint Programme	Africa	Ethiopia	2013	Private Sector Development	Independent Thematic Evaluation UNIDO's work in the area of Persistent Organic Pollutants (POPs)
Technical assistance project for the upgrading of the Ethiopian leather and leather products industry	Africa	Ethiopia	2013	Trade Capacity Building	Thematic Evaluation of UNIDOS Projects related to Industrial Upgrading
UNIDO – National Cleaner Production Centre, Sri Lanka	Asia	Sri Lanka	2013	Energy and Environment	Topic: NCPC National Cleaner Production Centre
Africa (Accelerated) Agribusiness and Agro industries Development Initiative (3ADI)	Global	Global	2014	Poverty Reduction through Productive Activities	Independent Thematic Evaluation UNIDO's work in the area of Persistent Organic Pollutants (POPs)
Mini-grids based on small hydropower sources to augment rural electrification in Tanzania	Africa	Tanzania	2015	Safeguarding the Environment	Thematic Synthesis of INDEPENDENT EVALUATIONS OF UNIDO RENEWABLE ENERGY PROJECTS FROM 2016-2021
Tanzania Industrial Upgrading and Modernization Programme (TIUMP)	Africa	Tanzania	2016	Advancing Economic Competitiveness	Topics: Upgrading
SPWA-CC Promoting Renewable Energy Based Mini-Grids for Rural Electrification and Productive Uses in Chad	Africa	Chad	2016	Safeguarding the Environment	Thematic Synthesis of INDEPENDENT EVALUATIONS OF UNIDO RENEWABLE ENERGY PROJECTS FROM 2016-2028
Promoting renewable energy-based grids in rural communities for productive uses in Côte d'Ivoire	Africa	Ivory Coast	2016	Safeguarding the Environment	Thematic Synthesis of INDEPENDENT EVALUATIONS OF UNIDO RENEWABLE ENERGY PROJECTS FROM 2016-2027
Review and update of the National Implementation for the Stockholm Convention on Persistent Organic Pollutants	Asia	China	2016	Safeguarding the Environment	Independent Thematic Evaluation UNIDO's work in the area of Persistent Organic Pollutants (POPs)
Promoting Ultra low-head Micro Hydropower Technology to Increase Access to Renewable Energy for Productive Uses in Rural India	Asia	India	2016	Safeguarding the Environment	Thematic Synthesis of INDEPENDENT EVALUATIONS OF UNIDO RENEWABLE ENERGY PROJECTS FROM 2016-2025

Evaluation Name	Region	Country	Year	UNIDO thematic priority	Thematic Evaluation or Topic
Upgrading the Medicinal and Aromatic Plant Value Chain – Access to Export Markets (EMAP)	Middle east and North Africa	Egypt	2016	Advancing Economic Competitiveness	Topics: Upgrading
Independent Terminal Evaluation Promoting Renewable Energy Based Mini Grids for Productive Uses in Rural Areas in the Gambia	Africa	Gambia	2018	Safeguarding the Environment	Thematic Synthesis of INDEPENDENT EVALUATIONS OF UNIDO RENEWABLE ENERGY PROJECTS FROM 2016-2020
Promoting market-based development of small to medium-scale renewable energy systems in Cape Verde	Africa	Cape Verde	2019	Safeguarding the Environment	Thematic Synthesis of INDEPENDENT EVALUATIONS OF UNIDO RENEWABLE ENERGY PROJECTS FROM 2016-2024
Capacity Strengthening and Technical Assistance for the Implementation of the Stockholm Convention (SC) National Implementation Plans (NIPs) in African Least Developed Countries (LDCs) of the SADC and COMESA Sub-regions	Africa	COMESA: Burundi, Djibouti, D.R. Congo, Ethiopia, Rwanda, Sudan and Uganda Angola, Lesotho, Mozambique, SADC: Swaziland, Tanzania	2019	Safeguarding the Environment	Independent Thematic Evaluation UNIDO's work in the area of Persistent Organic Pollutants (POPs)
Climate change related technology transfer for Cambodia: Using agricultural residue biomass for sustainable energy solutions	Asia	Cambodia	2019	Safeguarding the Environment	Thematic Synthesis of INDEPENDENT EVALUATIONS OF UNIDO RENEWABLE ENERGY PROJECTS FROM 2016-2023
Terminal Evaluation. Overcoming policy, market and technological barriers to support technical innovation and south-south technology transfer: The pilot case of ethanol production from cassava	Asia	Thailand	2019	Safeguarding the Environment	Thematic Synthesis of INDEPENDENT EVALUATIONS OF UNIDO RENEWABLE ENERGY PROJECTS FROM 2016-2022
Capacity strengthening and technical assistance for the implementation of the Stockholm Convention (SC) National Implementation Plans (NIPs) in African Least Developed Countries (LDCs) of the ECOWAS sub-region	Africa	Africa	2020	Safeguarding the Environment	Independent Thematic Evaluation UNIDO's work in the area of Persistent Organic Pollutants (POPs)
ITPO BAHRAIN UNIDO INVESTMENT AND TECHNOLOGY PROMOTION OFFICE IN MANAMA, BAHRAIN (ITPO BAHRAIN, 2017-2019)	Middle East and North Africa	Bahrain	2020	Advancing Economic Competitiveness	Independent Thematic Evaluation UNIDO Investment Technology Promotion Offices' Network

Table A.2.5 Distribution of projects by country and year

Row Labels	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Philippines								1				1
Africa											1	1
ALGERIA, BAHRAIN, DJIBOUTI, EGYPT, IRAQ, JORDAN, KUWAIT, LEBANON, LIBYA, MAURITANIA, MOROCCO, OMAN, QATAR, SAUDI Arab region IA, SOMALIA, STATE OF PALESTINE, SUDAN, SYRIAN Arab region REPUBLIC, TUNISIA, UNITED Arab region EMIRATES, YEMEN					1							1
Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestine and Tunisia										1		1
Algeria; Egypt; Jordan; Lebanon; Morocco; Palestine; Tunis									1			1
Angola					1							1
Angola, Botswana, Comoros, Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia, Zimbabwe								1				1
Area south Ecuador – North Peru								1				1
Argentina								1				1
Armenia			1					2		1	1	5
Armenia				1								1
Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and Ukraine									1			1
Azerbaijan								1				1
Bahrain											1	1
BANGLADESH, BHUTAN, MALDIVES, NEPAL			1									1
BENIN, BURKINA FASO, CABO VERDE, CÔTE D'IVOIRE, The GAMBIA, GHANA, GUINEA, GUINEA BISSAU, LIBERIA, MALI, NIGER, NIGERIA, SENEGAL, SIERRA LEONE, TOGO					1							1
Bhutan, Nepal and Maldives								1				1

Row Labels	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Burkina Faso						1						1
Burkina Faso, Mali and Senegal									1			1
Cambodia				1	1	1	1			1		5
Cambodia, Indonesia, Lao PDR, Mongolia, Philippines and Thailand.							1					1
Cambodia, Lao PDR and Viet Nam		1										1
Cambodia, Lao People's Democratic Republic								1				1
Cameroon										1		1
Cape Verde										1		1
Central Africa										1		1
Chad							1					1
China	1									1		2
China						1	2		1			4
Colombia									1			1
COMESA: Burundi, Djibouti, D.R. Congo, Ethiopia, Rwanda,												
Sudan and Uganda												
Angola, Lesotho, Mozambique, SADC: Swaziland, Tanzania										1		1
Congo					1							1
COTE D'IVOIRE, GUINEA, LIBERIA, SIERRA LEONE	1											1
Cuba						1						1
Developing and transition countries									1			1
Dominican Republic							1					1
Egypt			1				2					3
Egypt								3	1			4
Egypt, Jordan, Palestine, Morocco, Lebanon, Tunisia								1				1
Ecuador							1					1
Ethiopia				2					1			3
Gambia							2		1			3

Row Labels	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Germany	1											1
Global	1			2	1	3	3	1				11
Global, LMICs												
across Africa, Asia and Latin America										1		1
Guatemala		1										1
Guinea								1				1
Guinea current			1									1
India		1	2	1	1		1		6			12
Indonesia				1			1	1		2		5
Iran										1		1
Iraq	2	3	2	4					1			12
Italy			1									1
Ivory Coast					1	1	1					3
Japan	1			1								2
Yemen, Sudan, Jordan, Egypt		1										1
Kenya				1								1
Kenya, Tanzania and Uganda		1										1
Kyrgyzstan									1			1
Lao	1											1
Lebanon	1											1
Liberia					1	1						2
Madagascar								1				1
Malawi			1									1
MALAYSIA							1		2			3
Morocco								1		1		2
Mexico					1							1
Moldova						2				1		3
Mongolia								1	1			2
Morocco							1				1	2
Mozambique					1							1
Myanmar										1		1
Nepal						1						1

Row Labels	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Nicaragua				1								1
NIGERIA						1				1		2
North Macedonia					1							1
Pakistan						1				1		2
Palestine		1			1							2
Peru								1				1
Philippines						1	1			1		3
Romania	1											1
Russia							1		2			3
Shanghai											1	1
Sierra Leone					1							1
Small Islands		1										1
Somalia				1			1					2
South Africa				1								1
South Africa						2				2		4
South Africa				1								1
South Sudan					1							1
Sri Lanka	1	1		1	1							4
SUDAN		1			2			1	1			5
Tanzania						1	2			1		4
THAILAND						1	1			2	1	5
Tunisia						1	1			1		3
Turkey				1					1			2
Uganda			1									1
UKRAINE					1		1	1		1		4
Uruguay								1				1
Viet Nam		1	1	3			1		1	1		8
Zambia					1							1
Total	11	13	12	23	20	22	26	23	25	26	6	207

Source: Authors based on UNIDO project evaluations database

A.3. Annex 3: Coding System

Table A.3.1 List of Codes, its Searching Criteria and Number of Coded Text

Framework	Code	Word Query	Number of files coded	Number of mentions
Processes	Beneficiaries – For Whom	Text search: benefi*	192	7,890
Processes	Impact Results – Done	Text search: impact* OR result* OR performance*	192	16,055
Processes	Institutions involved – Who	Text search: execut* OR deliver* OR institution* OR conducted OR center*	192	15,576
Processes	Objectives – Aim	Text search: objective*	192	7,166
Processes	Products Services Processes Activities – How	Text search: product* OR service* OR process*. Also agregation of types of processes such as upgrading and facilitation	192	18,320
Processes	Products Services Processes Activities – How\Facilitation	Text search: facilitation	93	247
Processes	Products Services Processes Activities – How\Upgrading	Text search: upgrading	108	865
Processes	Resources – What	Aggregation of monetary resources and public goods resources	192	15,915
Processes	Resources – What\Public goods	Text search: public AND good*	190	5,170
Processes	Resources – What\Resources	Text search: resource* OR input* OR budget*	192	10,742
Processes	UNIDO's work	Text search: UNIDO's work OR UNIDO's activities	192	27,431
Thematic	Capacity Building	Text search: capability OR capacity OR capabilities OR capacities OR building cap*	192	10,027
Thematic	Change		192	11,405
Thematic	Change\Actual Changes	Text search: change OR changes OR changed	191	4,856
Thematic	Change\Expected Change – Theory of change	Text search: theory of change OR expected change	192	6,549
Thematic	Innovation	Text search: innova* OR adopt*	192	4,000
Thematic	Policy	Which policies influence/create the project or policy results of the project. Text search: policy OR policies OR norm* OR regulat*	192	8,494
Thematic	Science & Technology	Text search: scien* OR technolog*	191	6,717
SDG	Inclusive	Text search: inclus*	160	1,054
SDG	Industrialization	Text search: industrial* OR industrializ*	76	192
SDG	Infrastructure	Text search: infrastructure	163	1,183
SDG	Resilient	Text search: resilien*	86	191
SDG	SDG	Text search: sustaina* OR SDG OR SDG9	192	7,749

Figure A.3.1. Word Cluster Analysis – Process Framework

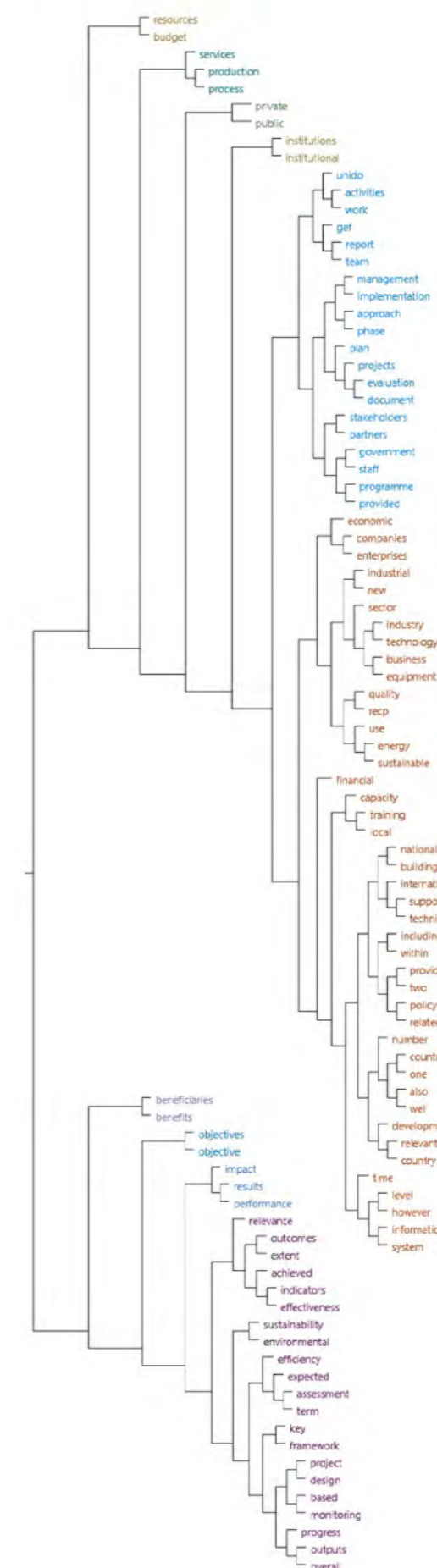


Figure A.3.2. Word Cluster Analysis – Thematic Framework

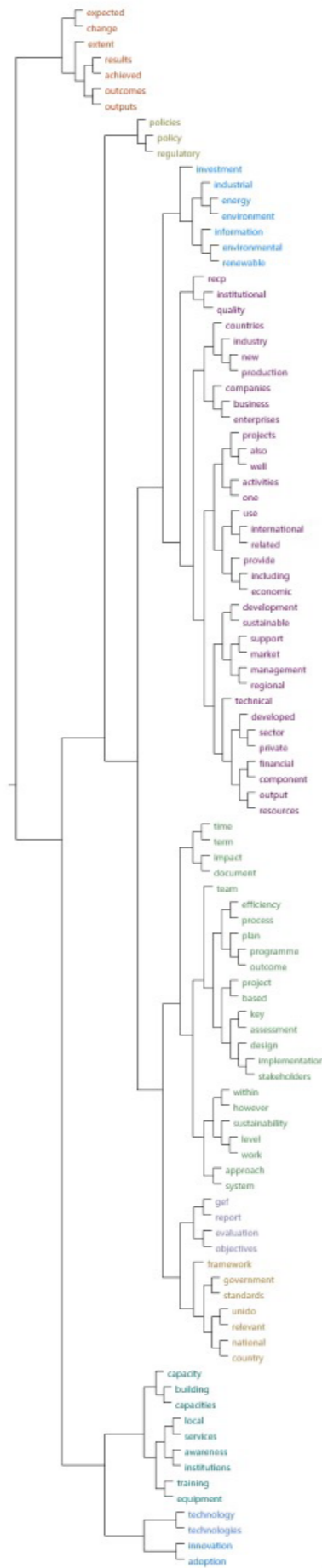


Figure A.3.3. Word Cluster Analysis – SDG9 Framework

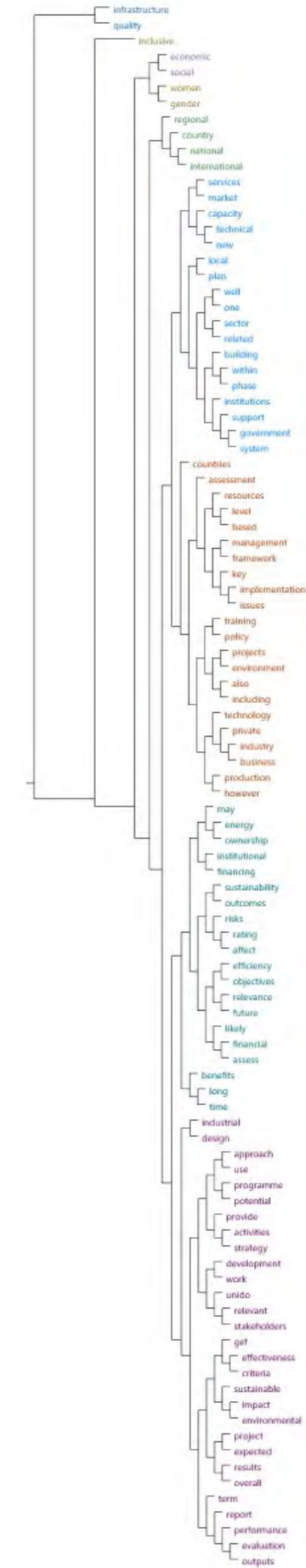


Table A.3.2 Coding of Theme Framework of the 23 Projects Selected for In-depth Analysis

Title	A: Capacity Building	B: Change	C: Innovation	D: Policy	E: Science & Technology
Shanghai International Information Technology Promotion Centre (SITPC). Enhancing IT Cooperation and Partnerships in the Asia-Pacific Region	23	12	3	20	48
Increase Access to Export Markets for Lebanese Products and Improvement of its Quality Infrastructure to increase TBT SPS Compliance MACLE	55	18	9	17	16
Trade capacity building in agro-industry products for the establishment and proof of compliance with international market requirements in the East African Community (EAC)	60	65	14	79	10
Development of a National Implementation Plan in India as a First Step to Implement the Stockholm Convention on Persistent Organic Pollutants	73	43	12	89	62
Independent Ex-post Evaluation UNIDO Support to the National Cleaner Production Centre in Viet Nam	28	22	12	56	29
Edible Oil Value Chain Enhancement Joint Programme	58	59	7	27	22
Identification, assessment and prioritization of pollution "hot spots" and transfer of environmentally sound technologies (TEST) in the Cambodian Section of the Mekong River basin	23	17	7	38	31
UNIDO – National Cleaner Production Centre, Sri Lanka	21	24	1	25	10
Africa (Accelerated) Agribusiness and Agro industries Development Initiative (3ADI)	57	58	23	39	14
Mini-grids based on small hydropower sources to augment rural electrification in Tanzania	48	47	11	44	23
Tanzania Industrial Upgrading and Modernization Programme (TIUMP)	47	39	18	35	27
SPWA-CC Promoting Renewable Energy Based Mini-Grids for Rural Electrification and Productive Uses in Chad	52	81	10	72	22
Promoting renewable energy-based grids in rural communities for productive uses in Côte d'Ivoire	73	53	10	60	20
Review and update of the National Implementation for the Stockholm Convention on Persistent Organic Pollutants	62	34	13	53	34
Promoting Ultra low-head Micro Hydropower Technology to Increase Access to Renewable Energy for Productive Uses in Rural India	43	40	13	36	97
Upgrading the Medicinal and Aromatic Plant Value Chain – Access to Export Markets (EMAP)	36	30	12	18	18
Promoting Renewable Energy Based Mini Grids for Productive Uses in Rural Areas in the Gambia	34	35	2	35	15

Title	A: Capacity Building	B: Change	C: Innovation	D: Policy	E: Science & Technology
Promoting market-based development of small to medium- scale renewable energy systems in Cape Verde	52	55	11	43	12
Capacity Strengthening and Technical Assistance for the Implementation of the Stockholm Convention (SC) National Implementation Plans (NIPs) in African Least Developed Countries (LDCs) of the SADC and COMESA Sub-regions	29	44	23	41	24
Climate change related technology transfer for Cambodia: Using agricultural residue biomass for sustainable energy solutions	57	66	18	83	117
Overcoming policy, market and technological barriers to support technical innovation and south-south technology transfer: The pilot case of ethanol production from cassava	78	66	24	119	176
Capacity strengthening and technical assistance for the implementation of the Stockholm Convention (SC) National Implementation Plans (NIPs) in African Least Developed Countries (LDCs) of the ECOWAS sub-region	41	39	25	32	30
UNIDO INVESTMENT AND TECHNOLOGY PROMOTION OFFICE IN MANAMA, BAHRAIN (ITPO BAHRAIN, 2017 – 2019)	34	25	27	31	58
Total	1,084	972	305	1,092	915

Table A.3.3 Coding of SDG Framework of the 23 Projects Selected for In-depth Analysis

Title	F: Inclusive	G: Industrialization	H: Infrastructure	I: Resilient	J: SDG
Shanghai International Information Technology Promotion Centre (SITPC). Enhancing IT Cooperation and Partnerships in the Asia-Pacific Region	2	1	12	0	13
Increase Access to Export Markets for Lebanese Products and Improvement of its Quality Infrastructure to increase TBT SPS Compliance MACLE	0	6	23	1	20
Trade capacity building in agro-industry products for the establishment and proof of compliance with international market requirements in the East African Community (EAC)	7	3	33	0	34
Development of a National Implementation Plan in India as a First Step to Implement the Stockholm Convention on Persistent Organic Pollutants	9	3	22	0	30
Independent Ex-post Evaluation UNIDO Support to the National Cleaner Production Centre in Viet Nam	1	7	0	0	29
Edible Oil Value Chain Enhancement Joint Programme	6	0	4	0	28
Identification, assessment and prioritization of pollution "hot spots" and transfer of environmentally sound technologies (TEST) in the Cambodian Section of the Mekong River basin	0	0	0	0	30
UNIDO – National Cleaner Production Centre, Sri Lanka	0	10	1	0	32
Africa (Accelerated) Agribusiness and Agro industries Development Initiative (3ADI)	17	5	13	0	22
Mini-grids based on small hydropower sources to augment rural electrification in Tanzania	4	0	0	1	43
Tanzania Industrial Upgrading and Modernization Programme (TIUMP)	8	10	2	0	24
SPWA-CC Promoting Renewable Energy Based Mini-Grids for Rural Electrification and Productive Uses in Chad	4	0	1	0	54
Promoting renewable energy-based grids in rural communities for productive uses in Côte d'Ivoire	4	2	3	3	46
Review and update of the National Implementation for the Stockholm Convention on Persistent Organic Pollutants	1	2	1	0	28
Promoting Ultra low-head Micro Hydropower Technology to Increase Access to Renewable Energy for Productive Uses in Rural India	2	2	4	0	44
Upgrading the Medicinal and Aromatic Plant Value Chain – Access to Export Markets (EMAP)	1	0	4	0	37
Promoting Renewable Energy Based Mini Grids for Productive Uses in Rural Areas in the Gambia	0	0	1	0	30
Promoting market-based development of small to medium-scale renewable energy systems in Cape Verde	4	0	3	1	26

Title	F: Inclusive	G: Industrialization	H: Infrastructure	I: Resilient	J: SDG
Capacity Strengthening and Technical Assistance for the Implementation of the Stockholm Convention (SC) National Implementation Plans (NIPs) in African Least Developed Countries (LDCs) of the SADC and COMESA Sub-regions	9	0	0	1	38
Climate change related technology transfer for Cambodia: Using agricultural residue biomass for sustainable energy solutions	6	0	2	1	48
Overcoming policy, market and technological barriers to support technical innovation and south-south technology transfer: The pilot case of ethanol production from cassava	6	0	4	1	53
Capacity strengthening and technical assistance for the implementation of the Stockholm Convention (SC) National Implementation Plans (NIPs) in African Least Developed Countries (LDCs) of the ECOWAS sub-region	4	0	0	0	22
UNIDO INVESTMENT AND TECHNOLOGY PROMOTION OFFICE IN MANAMA, BAHRAIN (ITPO BAHRAIN, 2017-2019)	4	4	2	1	37
Total	99	55	135	10	768

A.4. Annex 4: In-depth Analysis and Examples

Table A.4.1 Detailed Examples of UNIDO's Interventions in Scientific and Technology Services (STS)

STS	Example	Source
A. Technical S&T support activities		
A.1 Engineering, architectural, environmental, other technical advisory services	"It should be highlighted that UNIDO's support consisted in advice on rather than funding for technological upgrading."	Identification, assessment and prioritization of pollution "hot spots" and transfer of environmentally sound technologies (TEST) in the Cambodian Section of the Mekong River basin
	The UNIDO 1997 Business Plan reoriented UNIDO's activities from supporting individual companies to institutional capacity building and policy advice.	UNIDO Investment and Technology Promotion Office in Manama, Bahrain (ITPO Bahrain, 2017 – 2019)
	The project document states that UNIDO will "stimulate and guide the local development of IT infrastructure through advice and consultation service, policy study and formulation.	Shanghai International Information Technology Promotion Centre (SITPC). Enhancing IT Cooperation and Partnerships in the Asia-Pacific Region
	In Uganda, UNIDO "provided assistance to Chemiphar, a private laboratory and to the Ugandan Bureau of Standards (UNBS) microbiological and chemical laboratories for accreditation to ISO 17025 for microbiological and chemical analyses. It also assisted more than 60 food processing enterprises with introducing Good Manufacturing Practice (GMP), Good Hygiene Practice (GHP) and hazard analysis critical control points (HACCP) food safety management systems."	Trade capacity building in agro-industry products for the establishment and proof of compliance with international market requirements in the East African Community (EAC)
	As part of the UNIDO CP, the TIUMP which was launched in 2012 aims to promote competitive industrial production and market access by private sector enterprises through among other interventions building the capacities of support institutions to deliver the appropriate services. At the enterprise level, the TIUMP provides the necessary training and advisory support on technology and business processes to improve the quality and quantity of industrial output.	Tanzania Industrial Upgrading and Modernization Programme (TIUMP)
A.2 Metrology, standards	"Implementation: Most activities have been completed as planned. As of October 2009 the following activities were still under implementation: (1) support to laboratories to obtaining accreditation and proficiency testing (2) the twinning arrangement with the Swiss Packaging Institute (SVI), (3) visits to trade fairs, (4) traceability schemes for apples and olive oil, and (5) standard operating procedures and business plan for LibanPack. Taking into consideration the shortage of qualified metrology staff, the Steering Committee decided that a basic set of calibration equipment for market surveillance should be procured instead of the originally planned mobile calibration unit. Finalizing the accreditation of the two packaging laboratories, the standard operation procedures for LibanPack and the traceability schemes will be essential for the success of the project."	Increase Access to Export Markets for Lebanese Products and Improvement of its Quality Infrastructure to increase TBT SPS Compliance MACLE

STS	Example	Source
	"the EAC and EC agree to cooperate in helping and facilitating the compliance of EAC products with formal standards of the EU and other markets. This will include support for harmonization of SPS standards, promoting capacity in both public and private sector for sanitary control through development and implementation of quality programs, TA, harmonizing appropriate regulatory frameworks and policies between and within the parties, training and information exchange." "In Tanzania, UNIDO projects funded supported the strengthening the metrology laboratory at the Tanzanian Bureau of Standards (TBS) as part of an upgrade of the national quality infrastructure. This also included internal auditor training for Food Safety Management Systems (FSMS) to assist nine participating companies to implement quality management system necessary to meet the requirements of ISO 22000."	Trade capacity building in agro-industry products for the establishment and proof of compliance with international market requirements in the East African Community (EAC)
	"The immediate objective of the project was to create an enabling environment in the ECOWAS Subregion by establishing/amending laws, regulations, policies and standards, strengthening institutions for the remediation of contaminated sites, introducing BAT/BEP to industrial processes, managing municipal solid wastes, health-care wastes, supporting the phasing out of agricultural use of POP pesticides through the promotion of best agricultural practices including the use of bio-botanical pesticides and promoting locally designed technologies development."	Capacity strengthening and technical assistance for the implementation of the Stockholm Convention (SC) National Implementation Plans (NIPs) in African Least Developed Countries (LDCs) of the ECOWAS sub-region
	"Output 2.3: Mobile calibration and metrology laboratory for market surveillance." This objective was cancelled but the Steering Committee agreed to purchase a number of small calibration equipment for market surveillance officials instead.	Increase Access to Export Markets for Lebanese Products and Improvement of its Quality Infrastructure to increase TBT SPS Compliance MACLE
A.3 Testing and quality control	"MACLE addressed issues related to Sanitary and Phytosanitary Measures (SPS), to Technical Barriers to Trade (TBT) and to strengthening the competitiveness of Lebanese enterprises ¹¹ . In 2004 a survey among 100 Lebanese exporters revealed the major challenges for Lebanese food exporters, such as difficulties to proof conformity of products with mandatory standards of importing countries and a large number of rejections due to wrong labelling and deficient packaging ¹² . Non-compliance with quality management standards related to food safety was identified as another problem. With its focus on the improvement of packaging testing, advisory services for packaging and labelling and on compliance with food safety requirements of key export markets (in particular traceability), MACLE was designed as a complementary effort to the more comprehensive EU quality programme (QUALEB). UNIDO identified the appropriate partners responsible for the various fields of the intervention. Taking into account the important role of the civil society in Lebanon, the project worked closely with private sector associations, industrialists and chambers of commerce."	Increase Access to Export Markets for Lebanese Products and Improvement of its Quality Infrastructure to increase TBT SPS Compliance MACLE

STS	Example	Source
	Testing laboratories in all EAC countries have been provided with equipment to strengthen their capacity to provide conformity assessment services to exporters in line with international standards. The new equipment allows them to carry out tests to assess if food products meet microbiological criteria and chemical maximum residue limits (MRLs) and they are expected to proceed to ISO 17025 accreditation for various product tests. Although the laboratories will not be accredited within the time frame of the project, the ET is confident that this objective will be achieved in 2012. The ET is also confident that the intervention will be sustainable as the laboratories appear to have good governance and funding in place for maintenance of the equipment and reference materials.	Trade capacity building in agro-industry products for the establishment and proof of compliance with international market requirements in the East African Community (EAC)
B. Scientific data collection and analysis		
B.1 Surveying, prospecting and mapping	“Surveys were undertaken and questionnaires released to collect data and information on some sources of unintentionally produced POPs in India;” ... However, “the quality of the NIP and its Annexes was found to be rather low as it failed to use common scientific methods such as statistical analyses to assist with the development of the inventory of POPs; survey methodologies were inadequate; and there was limited information on alternatives to DDT”.	Development of a National Implementation Plan in India as a First Step to Implement the Stockholm Convention on Persistent Organic Pollutants
B.2 Astronomical and geophysical monitoring, environmental testing	A preliminary inventory of wastes and contaminated sites was established through questionnaires and field visits;	Development of a National Implementation Plan in India as a First Step to Implement the Stockholm Convention on Persistent Organic Pollutants
	The UPPOPs strategic plan, including the formulation of the inventory of PCBs, PeCP, PCPs and other UPPOPs (except for PCDDs/PCDFs), and the inventory methodology for these UPPOPs; the analysis of the inventory of PCDDs/PCDFs, and the priority of the actions for control of PCDDs/PCDFs; the model of synergy effects between the measurement of improving air quality and the control of PCDDs/PCDFs, and identification of the possibility of synergies between the air quality policy and PCDDs/PCDFs, control policy; the analysis of the technology and the evaluation of the costs of control of UPPOPs, is drafted.	Shanghai International Information Technology Promotion Centre (SITPC). Enhancing IT Cooperation and Partnerships in the Asia-Pacific Region
B.3 Routine socioeconomic data collection and analysis		

STS	Example	Source
C. Governance, management and legal framework supporting S&T		
C.1 Administration, management, funding of S&T	The Upgrading Unit Tanzania (UUT) project management unit was established from the onset of the Project. It has been staffed by the CTA, who has acted as the Head of the UUT, a technologist, an assistant and a driver. The foreseen complement of staff (i.e. a financial analyst and a substantive Head of Unit) has yet to be recruited. Reasons for this stem from the unavailability of budgetary allocations from the MITI. The Evaluation found that barring the above shortcoming, the UUT is equipped with the required managerial and operational skills and tools for the management and follow-up of the Industrial Upgrading and Modernization Programme in Tanzania (TIUMP).	Tanzania Industrial Upgrading and Modernization Programme (TIUMP)
C.2 Intellectual property protection		
C.3 Analytical studies supporting S&T policymaking	The NCPC Centre has influenced policy makers to introduce CP policies and some amendments to the Environment Act of the country favourable to promote CP technologies. Following from the above, it goes without saying that the Project, and centre activities, is very relevant.	UNIDO – National Cleaner Production Centre, Sri Lanka
	The work undertaken in the Project strengthened the capacity of several of the participating institutes and placed them in a good position to continue the work in the future. Some of the institutes spent funds from their own budgets for work on POPs. These Institutes stated their commitment to employing more staff and purchasing equipment for post-NIP projects. The contractor CPCB intended to invest in more laboratory equipment in 2011 that would enable further work on dioxins. In this regard, the project has had a sustainable impact.	Development of a National Implementation Plan in India as a First Step to Implement the Stockholm Convention on Persistent Organic Pollutants
	Additional activities were added in the course of implementation with the purpose of (a) awareness raising on the TEST methodology (enterprises and government officials), (b) incentives for environmentally friendly production and (c) strengthening enforcement, and (d) mainstreaming “green industry practices” into industrial policies. Those included support for the establishment of a “Green Industry Award”, advocacy for and support to policy making, a study visit to Korea to familiarize participants with modern technology, and some testing equipment.	Identification, assessment and prioritization of pollution “hot spots” and transfer of environmentally sound technologies (TEST) in the Cambodian Section of the Mekong River basin
	In Uganda the UNIDO project ‘Integrated Programmed Support to agro-processing industries’ supported a co-ordinated approach to developing national food safety policy including preparing a National Food Safety bill and the National Food Safety Strategic Plan.	Trade capacity building in agro-industry products for the establishment and proof of compliance with international market requirements in the East African Community (EAC)
	Implicitly, one of the objectives of the TIUMP is to hand over to the Government a tool of Industrial Policy to improve economic competitiveness (UUT, Methodology, technical centres) which is in line with recent Tanzania’s Big Result Now programme (BRN).	Tanzania Industrial Upgrading and Modernization Programme (TIUMP)

STS	Example	Source
D. Preservation, interpretation and dissemination of scientific information and knowledge		
D.1 Preservation, interpretation and dissemination of S&T related knowledge	Five workshops discussed technical aspects with relevant stakeholders such as private sector representatives of SMEs, industrial and agricultural associations, academic institutions, testing laboratories, public institutions and Government bodies.	Development of a National Implementation Plan in India as a First Step to Implement the Stockholm Convention on Persistent Organic Pollutants
	The project impact was enhanced by the skilful combination of different measures such as VNCPC capacity building, policy advice, CP demonstration through pilot projects, awareness raising and dissemination of results, together with the contribution of the VNCPC to projects of other donors.	Independent Ex-post Evaluation UNIDO Support to the National Cleaner Production Centre in Viet Nam
	Being a key activity area under the Project, different approaches such as: lectures; seminars; information dissemination through leaflets, posters, books, manuals, and website; exhibitions; and annual CP Award ceremonies have been used. The awareness has been targeting different groups, e.g. policy makers, industries, enterprises, public and private sector officials, universities, technical colleges, schools and civil society organizations, etc.	UNIDO – National Cleaner Production Centre, Sri Lanka
	Workshop on open data and knowledge environments for innovative research and development. In China, the dissemination of IT information and the acquisition of IT knowledge can be achieved solely by communication and instruction in Chinese, and thus can only be carried out by Chinese experts. In this respect, Shanghai provides the location and source of expertise for both international communications, as well as for domestic outreach.	Shanghai International Information Technology Promotion Centre (SITPC). Enhancing IT Cooperation and Partnerships in the Asia-Pacific Region
	Cooperation with Tshwane University of Technology (TUT), Pretoria, South Africa – Following a visit made by a UNIDO team in September 2011 to the laboratories at TUT in Pretoria, engaged on research and publishing on POPs in the environment, representatives of the LDCs of the COMESA and SADC sub-regions agreed during a meeting held in January 2012 in Ethiopia, that TUT would be the training institution on management of POPs for them. The countries also agreed that the project would upgrade the TUT laboratory to enable it to provide training to the technicians, researchers and experts of the LDCs at different opportunities during the projects' duration. In the context of this cooperation agreement, the project provided TUT with a liquid chromatography – Mass Spectrometry (LC-MS) equipment that was used for training purposes as well as analysis of project samples. TUT was mainly involved in the pilot projects (Outcome 1 and Outcome 3) where it successfully trained the personnel of the pilot companies, and academics, laboratory technicians and other personnel of the participating countries on sampling as well as analytical procedures. It also undertook the analysis of samples coming from the three pilot projects.	Capacity Strengthening and Technical Assistance for the Implementation of the Stockholm Convention (SC) National Implementation Plans (NIPs) in African Least Developed Countries (LDCs) of the SADC and COMESA Sub-regions

STS	Example	Source
D.2 Publishing and translating of S&T books, journals and other forms of printed and electronic publications	A video has been produced for the widely dissemination of the pilot projects, but the projects themselves have not been independently evaluated as foreseen	Promoting market-based development of small to medium-scale renewable energy systems in Cape Verde
	The Office had also been able to efficiently contribute to UNIDO's normative function by disseminating knowledge and has provided platforms such as the virtual innovation and entrepreneurship hub for the exchange of knowledge and experience on many issues, often beyond the investment and technology theme but clearly related to UNIDO's mandate and strategic priorities.	UNIDO Investment and Technology Promotion Office in Manama, Bahrain (ITPO Bahrain, 2017-2019)
	An EAC business guide on SPS and TBT issues to guide the business community in complying with the requirements for trade within and out of the region was prepared and approved for publishing by the EAC and EABC. A website to disseminate relevant information on SPS trade issues was also completed and linked to the EACB website.	Trade capacity building in agro-industry products for the establishment and proof of compliance with international market requirements in the East African Community (EAC)



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