

Leveraging synergies and tackling trade-offs among specific Goals

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Introduction

The notion of sustainable development embodies a compromise between those who prioritise social development, economic development, or the environment. The engagement of developed and developing countries with this Agenda has been largely achieved owing to this compromise (United Nations Environment Program [UNEP], 1992; United Nations Conference on Environment and Development [UNCED], 1992; Machingura & Lally, 2017). Long-term sustainable development requires understanding that resources are limited and development is only sustainable within those constraints (Weitz, Nilsson, & Davis, 2014).

The 2030 Agenda for Sustainable Development has taken this approach further by recognising these three pillars (economic development, social development, and environmental protection) are not isolated components, but deeply intertwined. While most of the 17 Sustainable Development Goals (SDGs) relate to one pillar, many embed all three. Advocates present this as an 'indivisible whole' (International Council for Science, 2017).

All SDGs are interconnected by design and interact in multiple ways. These interactions, however, are not always positive. In some cases, efforts aimed at achieving one Goal may hamper the realisation of others. Synergy—where policies to accomplish one Goal also help fulfil others—is one possible outcome. A trade-off—where policies to accomplish one Goal undermine others—is another possible outcome.

The need to analyse synergies and trade-offs in implementing the 2030 Agenda has become clear in the literature (Weitz, Carlsen, Nilsson, & Skånberg, 2018). It is critical because isolated policy initiatives can result in (i) incoherent policies, (ii) adverse impacts on policies in other areas, (iii) lost opportunities for maximising synergies, (iv) policy impact being delayed in unforeseen ways; and (v) impaired prioritisation and sequencing actions, resulting in less efficient or effective resource use (Mainali, Luukkanen, Silveira, & Kaivo-Oja, 2018; Weitz et al., 2018).

Policy coherence (a specific target under SDG 17) is one of the most pressing cross-cutting issues in the 2030 Agenda. According to a review by Organisation for Economic Co-operation and Development (OECD, 2018), the vast majority of Voluntary National Reviews (VNRs) presented by member countries of the United Nations to the High Level Political Forum (HLPF) highlighted policy coherence as one of the greatest difficulties in the implementation of the 2030 Agenda (United Nations Department of Economic and Social Affairs [UNDESA], 2017).

This chapter analyses synergies and trade-offs among SDGs as part of this flagship Southern Voice initiative, State of the SDGs (SVSS). Its major contribution is its scope and specificity. Incorporating findings from studies with diverse methodologies, conceptual approaches, and data sources, this chapter analyses a subset of SDGs, contrasting findings from country case studies with previous research on the same linkages. No previous study has been found to do this specifically.

Following this introduction, the second section will explore debates on synergies and trade-offs among SDGs, focussing on key concepts,

methodological approaches, and the use of data. The third section will introduce six case studies, producing a framework integrating findings from each. Finally, the fourth section will outline lessons learnt and policy implications for governments and other policy stakeholders. Along with the chapters on global systemic concerns and the 'leave no one behind' principle, this chapter provides an evidence-based perspective to support implementation efforts of the 2030 Agenda for Sustainable Development.

Analysing synergies and trade-offs among SDGs: State of the art

The research and policy agenda on synergies and trade-offs is not new. However, its application in the context of the 2030 Agenda is relatively recent. This section will first contextualise and conceptualise synergies and trade-offs as part of a broader analytical tradition related to policy coherence and coordination. It then presents a review of the main methodological approaches. Finally, it will review the main data sources and evidence used by studies so far.

Conceptualisation

Understanding synergies and trade-offs: context, emergence, and definitions

SDG linkages are gaining relevance in sustainable development debates, especially regarding domestic 2030 Agenda implementation and the effective and efficient use of resources through policy coherence. Drawing on previous literature regarding fragmented domestic government action and incoherence in international development interventions in Global South countries, this section briefly outlines these two developments and their contribution to this new field of study. It also outlines how this has informed the analytical framework presented in section 3.

Fragmented government action in national contexts

Interaction between fragmented policies is a long-standing issue in government and public management (Peters, 2018). Policy coordination, coherence, integration, and alignment have emerged as important concepts in understanding this process (Tosun & Leininger, 2017). Policy coordination refers to the exchange of knowledge and information and the definition of rules and responsibilities amongst actors (Cejudo & Michel, 2015). Coherence describes consistency between the individual objectives of each established initiative. Policy integration refers to policy design and implementation processes that build on previously coordinated and coherent policies towards a common goal (Cejudo & Michel, 2015).

Fragmented action in international development strategies: From the donor-recipient paradigm to policy coherence for sustainable development

The perils of policy fragmentation in development contexts were recognised at the turn of the century. Globally, transnational



Policy coherence (a specific target under SDG 17) is one of the most pressing cross-cutting issues in the 2030 Agenda.

1 This decision was made because of two issues directly related to the SVSS initiative and the structure of this Global Report in particular. The second policy coherence for sustainable development objective is excluded from the analysis in this chapter because of the nature of the evidence produced in the SVSS country case studies (which all analyse synergies and trade-offs among goals exclusively in national contexts). This is related to an overarching conceptual decision in the initiative to develop the third policy coherence for sustainable development objective (which focuses on the interplay between the domestic and the transnational) primarily in the global systemic concerns chapter.

development initiatives were inspired by a 'foreign aid' or 'donor-recipient' paradigm, involving Northern-dominated diagnoses of development challenges in countries in the South (Knoll, 2014). Initiatives designed and implemented under this paradigm often lacked coherence (Dijkstra, 2013). Consequently, many initiatives did not produce the desired results. The OECD began addressing these issues in the 1990s through the policy coherence for development framework (OECD, 2014). Policy coherence for development recognised that many non-aid and seemingly 'domestic' policies of donor countries had important transnational implications on development objectives (Knoll, 2014).

Notwithstanding its importance, policy coherence for development was still strongly based on a North-South paradigm and understood coherence as a primarily Northern responsibility (Knoll, 2014). Not until pre-SDG debates did paradigms around policy coherence shift towards universal approaches. This move entailed recognising and engaging with multiple development stakeholders and shifting from the idea that 'non-aid' policies should 'do no harm' to a proactive approach emphasising collective management of synergies and trade-offs (Knoll, 2014).

In this context, the policy coherence for sustainable development approach and framework were conceived. It seeks to foster synergies across economic, social, and environmental policy areas, identify trade-offs, reconcile domestic policy objectives with internationally agreed goals, and address negative spill overs of domestic policies (OECD, 2014). The adoption of the 2030 Agenda and the Paris Agreement in 2015 established a strong foundation for 'coherent implementation' of SDGs (United Nations, 2019b).

Defining synergies and trade-offs

The management of synergies and trade-offs is central to the policy coherence for sustainable development approach. It emphasises the interplay between local, subnational, national, and international levels of action, combining insights from literature on domestic-centred policy coordination/coherence/integration, as well as international literature that began with the development of policy coherence for development in the 1990s.

This chapter analyses the first objective in the policy coherence for sustainable development approach (Foster synergies across economic, social, and environmental policy areas) but will not explore the second and third objectives. These primarily concern the alignment of domestic policy goals with international objectives, and the mitigation of transboundary and intergenerational negative spill overs of domestic policies.¹

Synergies and trade-offs analyses are increasingly used in the international development community to foster critical understandings of policy interactions and to promote coordination and coherence in implementing the 2030 Agenda domestically. While the sustainable development literature tends to use the terms synergies and trade-offs to denote two distinct scenarios of either mutually-beneficial or zero-sum policy outcomes (Weitz et al., 2018); some significant

conceptual difficulties remain unsolved by this dichotomy. Some see synergies and trade-offs not as qualitatively distinct categories but as two sides of the same coin (Corning, 1998). Synergy can arise in many different forms, consistent with the notion that "sometimes, wholes are not greater than the sum of their parts, just different" (Mainali et al., 2018). A trade-off could, therefore, be understood as a 'negative synergy'.

We adopt a definition of synergies and trade-offs that can serve as a common denominator among different conceptual approaches. This will allow successful integration of the findings from the case studies, which use divergent methodologies, in section 3. Synergy describes where the implementation of policies benefits the targeted issue as well as untargeted issues. A trade-off describes an alternative situation where the implementation of policies targeting one issue undermines the possibility of achieving others. Finally, 'no-change' (neutral) describes where targeting one issue neither promotes nor undermines another.

Synergies and trade-offs in focus: dimensions and levels of analysis

Trade-offs and synergies can be evaluated across multiple levels and dimensions. First, they can arise and be analysed at individual, household, local, state or province, national, regional, and international levels. Interactions between the policies in different sectors at each of these levels are embedded in wider dynamics of vertical external coherence (i.e. of policy initiatives belonging to different sectors and different administrative levels), adding further complexity to the analysis (Nilsson, Zamparutti, Petersen, Nykvist, Rudberg, & McGuinn, 2012).

Second, many dimensions contextualise the assessment of specific synergies and trade-offs. They provide deeper insight into elements shaping interactions between SDGs and targets (International Council for Science, 2017). They include directionality, as well as dependency factors, such as place-specific context dependencies (trade-offs or synergies can vary from one spatial context and scale to another), governance dependency (a trade-off can be the result of poor governance), technology dependency (the application of technology can mitigate or eliminate apparent trade-offs), and timeframe dependency (some interactions develop in real time, while others show significant delays). The framework in section 3 will study these contextual dimensions further as when integrating findings from the country case studies.

The literature on Ecosystem Services adds one further caveat regarding reversibility. The likelihood that a targeted issue—if constrained by advances in another related area—will return to its original 'neutral' condition once the trade-off is resolved may vary in different contexts (Haase & Schwarz, 2012).

Methodological approaches to measuring synergies and trade-offs

There are two broad classifications for methodological approaches to studying the Goals: their qualitative or quantitative nature, and their systemic or non-systemic approach. A systemic approach allows for more complex analyses that go beyond observing how pairs of SDGs interact directly. It allows the researcher to capture effects related to the whole system, including indirect effects of one SDG on another, as mediated by a third Goal or Target (so-called 'second-order interactions') (Weitz, Carlsen, Skånberg, Dzebo, & Viaud, 2019).

Quantitative approaches

Many researchers have proposed quantitative methodological approaches, which can complement some qualitative designs, as will be analysed in the last subsection (mixed approaches).

On the systemic side, scenario analysis and quantitative modelling tools are the main alternatives to produce meaningful outputs that can inform policy decisions. These approaches can support prioritisation and sequencing decisions with concrete evidence from unexpected feedback loops among goals and targets (Weitz et al., 2019). In advanced stages of implementation, modelling specific interventions designed for different sectors (and assigned quantifiable goals) is useful for providing a nuanced view of the combined effect of all interventions (Millennium Institute, 2019).

Allen, Metternich, and Wiedmann (2016) reviewed 80 models and found common strengths and weaknesses. The dynamic nature of many models and their national scale are essential to support 2030 Agenda implementation efforts at the domestic level (Allen et al., 2016). Two particular models (Threshold 21 and International Futures) were deemed the most robust. The strength of the former was flexibility of application to a wide variety of national contexts; the strength of the latter was its ease of access and affordability (Allen et al., 2016).

The iSDG model, created by the Millennium Institute and based on Threshold 21, is a welcome development that has been expanded to cover all 17 SDGs (Collste, Pedercini, & Cornell, 2017). It is an interactive simulation model to help policymakers and experts achieve the SDGs. It contains 30 linked model sectors within the three dimensions of sustainability. The model maps key feedback loops between and within sectors, and nonlinear relationships and time lags that generate the complex systemic behaviours characteristic of interactions between SDGs (OECD, 2016a).

A disadvantage of this type of methodology is the lack of integration of variables from all three dimensions. Only a few models—including the recent iSDG—incorporate the variables necessary for application to all 17 SDGs. Variables related to social development are notably absent from most of these approaches (Allen et al., 2016).

Another disadvantage of quantitative modelling tools is that there are few repositories where this wide variety of models are listed, analysed and compared. The launch of the web-based platform Modelling



Trade-offs and synergies can be evaluated across multiple levels and dimensions.

Tools for Sustainable Development Policies has helped address this challenge. Therein, UNDESA presents a suite of five modelling tools that it and the United Nations Development Programme (UNDP), currently use in country contexts. The tools are: economy-wide modelling; integrated assessment of climate, land, energy, and water systems (CLEWS); energy systems dynamic modelling; geo-spatial electrification access modelling; and household-survey-based tools for micro-simulation of socio-economic impacts and electricity consumption. The tools' overarching goal is to improve government assessment of interlinkages across development dimensions and the impact of alternative policies may in different sectors (OECD, 2016a).

Finally, even though different quantitative approaches share a systemic basis, few truly account for complex interactions among Goals from different policy areas, and for spatial and temporal dynamics (Obersteiner, Walsh, Frank, Havlik, Cantele, Liu, & Van Vuuren, 2016; Neumann, Anderson, & Denich, 2018).

On the non-systemic side, some quantitative studies have employed pairwise correlations between Goals using data for their indicators. However, this approach has fallen short of moving from correlational analyses to the key question of causal inference (Pradhan, Costa, Rybski, Lucht, & Kropp, 2017), so they will not be presented at length here.

Qualitative approaches

Other studies have taken a qualitative approach, which identifies and assesses links among SDGs and targets. Consultations with policy experts, practitioners, and stakeholders, as well as complementary literature reviews based on secondary sources, are key data sources.

Nilsson et al. (2012) evaluate Goal linkages through a policy coherence analysis. Other authors have resorted to network analysis—the qualitative identification and coding of links on the basis of theory and available secondary evidence. Weitz et al. (2014) assess connections between SDGs using three complementary approaches: (i) screening for interactions among proposed targets; (ii) exploring the nature of interactions between targets (interdependent, constraining, and reinforcing); and (iii) identifying 'nexus targets' between sectors. Le Blanc (2015) is a further example of pure network analysis.

Some authors propose 'scoring' approaches for identifying and measuring the intensity and direction of interactions. The best-known scoring framework, by Nilsson et al. (2016), is currently regarded as the standard among scoring-based qualitative approaches (Weitz et al., 2019). Its advantages include ease of use, and more detailed comparisons than methodologies using binary scoring systems (positive/synergy vs. negative/trade-off) (Weitz et al., 2019).

This approach, especially when used alone, still faces challenges. A truly systemic approach requires time- and resource-intensive inclusion of all Goals and Targets; each linkage needs to be assessed qualitatively (Weitz et al., 2019). Aggregation of groups of indicators at the goal level is a possible workaround, but comes at the expense of the traceability and transparency of qualitative assessments

(Weitz et al., 2019). Expert and stakeholder judgements, used to set scores, may also not align (Weitz et al., 2019).

Mixed approaches

Other emerging methodologies and frameworks bridge the gap between qualitative and quantitative approaches, usually from a systemic perspective. Mainali et al. (2018) combine qualitative network analysis with Advanced Sustainability Analysis (ASA). The latter is a quantitative method conceptualising synergy as statistical interaction between two independent variables that makes their combined impact greater than sum individual impacts.

The initial scale presented by Nilsson et al. (2016) has been expanded upon and applied to SDG linkages in particular settings. Weitz et al. (2018) and Weitz et al. (2019) add quantitative components that result in mixed approaches. Weitz et al. (2018) analyse Goal interactions by building a cross-impact matrix, populated with results from a scoring exercise with experts (the authors) using the Nilsson et al. (2016) framework. This gives the approach a strong systemic advantage. Cross-impact matrix data is then visualised through network analysis techniques, and quantitative techniques are applied to identify positive and negative interactions. An advantage of this approach is that the authors can take second-order effects into account, and determine whether positive linkages have system-wide or limited impacts (Weitz et al., 2018). A weakness is that the quality of the analysis depends on the subjectivity of expert judgements.

Weitz et al. (2019) show how mixed approaches can be implemented with a highly systemic perspective. The authors apply a 'SDG Synergies approach' to the European Union, but only to a specific set of Goals and Targets. Building upon the network analysis and quantitative techniques first used by Weitz et al. (2018), they use a seven-point scale to assess interactions with data from experts, stakeholders, and secondary sources. However, the selection of only some Goals and Targets, as well as difficulties scoring interactions at a regional rather than national scale, makes differences among countries less discernible.

Use of data and evidence in analyses of synergies and trade-offs

The choice of methodological approach has implications for the data selected for analysis. Data quality and availability can limit eligible approaches and the scope of analysis, as will be noted when analysing the country case studies in this chapter.

Existing approaches use primary and secondary data sources. Primary sources are often used in studies applying qualitative methodologies, and involves coding indicators based on expert judgements and interviews with policy-relevant stakeholders for domestic contexts (Nilsson et al., 2016).

Secondary data sources are prominent in studies with quantitative approaches, and include national household surveys, international organisation databases, and data from national records (Mainali et al.,

2018). Secondary data and evidence are sometimes used in qualitative frameworks to complement data from expert judgements.

Research gaps and contributions

This study contributes to addressing two gaps. First, it analytically centres national-level evidence of linkages, offering a comparative perspective on results obtained from applying different methodologies to data in various countries. Second, it helps bridge the gaps between evidence of synergies and trade-offs and policy recommendations. The literature on policy coherence for the 2030 Agenda implementation has made great progress on the identification of cross-cutting institutional recommendations for maximising coherence among all goals. However, thematic and sectoral policy recommendations, and how specific policy changes implemented by line ministries can help maximise specific synergies, or minimise a particular trade-off, remain underexplored.

In the following section, the analysis will firstly centre on comparing new evidence on linkages with previous research to help contextualise findings and identify potential dependency factors. Secondly, it will derive thematic policy recommendations from these factors to guide policy design and implementation.

Synergies and trade-offs among SDGs in the Global South: insight from the SVSS initiative

The State of the SDGs initiative selected three SDGs (4, quality education; 7, affordable and clean energy; and 8, decent work and economic growth) for analysis of implementation efforts in six countries from the Global South (Peru, Bolivia, India, Sri Lanka, Ghana, and Nigeria). This selection takes into account the Goals reviewed during the High Level Political Forum in 2019, as well as Southern Voice's expertise.

Each case study team chose no more than two of these three SDGs for analysis. Teams focussed on the three cross-cutting issues underlined by SVSS. For synergies and trade-offs, they selected one to four additional SDGs to create pairs of goals and analyse their interaction in each country. Finally, each concluded with a section on the policy implications of the analysis.

The SVSS country case studies are heterogeneous in approach. Some chose quantitative methodologies, while others used mixed approaches. Data came mostly from secondary sources, but some case studies included the results from primary data collection strategies. Levels of analysis also differ; case studies diversely consider interactions between SDGs at a national, local, or individual level.

The aim of this section is to develop an integrated analysis, on the basis of an original framework developed for the Global Report, that can effectively galvanise action by policy makers on the findings from all six countries.²

2 A few methodological caveats need to be mentioned here. Given that in most case studies, non-systemic approaches to synergies and trade-offs were selected, this chapter could not produce an overarching systemic framework to integrate findings, because the focus was expected to be on exploiting original SVSS research. Therefore, the analysis in section 3 is conducted at the level of direct (first-order) SDG interlinkages. This has obvious limitations in light of the discussion presented in section 2. The objective of this chapter, as shown in the preliminary section is not, however, to make a necessarily innovative methodological development, but to present a framework for analysing and comparing new national-level evidence, as well as bridging the gap between these findings and concrete policy recommendations for decision-makers.

3 The six SVSS country case studies, including relevant country context, methodological approach, and type of data used for evaluating synergies and trade-offs, are briefly presented in Annex 4.1, as guidance for the reader.

Section 3 will first present an original framework to standardise and compare country synergies and trade-offs exercises in a visual matrix (Table 4.1). This section also considers the subcomponents of the framework and the findings central to identifying concrete policy implications. Second, this section will consider five of the eleven pairs of SDGs from the country studies. For each of these five pairs, evidence on the linkage between the two in previous research, followed by results of this set of studies, are discussed.³ The goal is to ascertain whether new evidence on these SDG pairs matches previous evidence; what new insights policymakers and international stakeholders should bear in mind regarding policy coherence; and explore potential country-specific dependency hypotheses that could explain unforeseen results (International Council for Science, 2017).

Framework

The original framework developed for this study and presented in Table 4.1 builds upon the literature review and context identified in section 2, and takes into account the contextual restrictions mentioned at the beginning of this section. It is organised into two main categories for analysis.

The first category is approach. This identifies differences and commonalities among the methodological approaches in the six cases, and whether a methodology or conceptual framework about synergies and trade-offs is extant in the literature or represents a new approach. Approach includes five dimensions: type (quantitative, qualitative or mixed); methodology; data sources; level of analysis; and contextual limitations. The Annex 4.1 describes these dimensions in more detail.

The second category is findings. This draws upon the synergies and trade-offs sections of the cases to map out the 11 different pairs of SDGs analysed: SDGs 4 (quality education) and 1 (no poverty); SDGs 4 (quality education) and 5 (gender equality); SDGs 8 (decent work and economic growth) and 5 (gender equality); SDGs 7 (affordable and clean energy) and 3 (good health and well-being); SDGs 4 (quality education) and 10 (reduced inequalities); SDGs 8 (decent work and economic growth) and 4 (quality education); SDGs 7 (affordable and clean energy) and 5 (gender equality); SDGs 4 (quality education) and 3 (good health and well-being); SDGs 8 (decent work and economic growth) and 12 (responsible consumption and production); SDGs 7 (affordable and clean energy) and 13 (climate action); and SDGs 7 (affordable and clean energy) and 15 (life on land) (see Table 4.1).

This section focuses on four of the above pairs analysed in at least two country studies (see matching pairs marked in colours in Table 4.1). To ensure full representation of all case studies, the section will also add a focus on a fifth group of SDGs (7, 3, and 5), a triad that will allow us to incorporate findings from the Ghanaian case study, given the close relationship among energy, health, and gender dimensions it highlights. The linkages to be analysed in depth are:

- SDGs 4 (quality education) and 1 (no poverty)
- SDGs 4 (quality education) and 5 (gender equality)
- SDGs 8 (decent work and economic growth) and 5 (gender equality)

- SDGs 8 (decent work and economic growth) and 4 (quality education)
- SDGs 7 (affordable and clean energy), 3 (good health and well-being), and 5 (gender equality)

For each pair, the framework highlights a series of analytic dimensions. These are: type of interaction (synergy, trade-off or neutral, with the first category also capturing cases with 'untapped' or 'unrealised' synergies, labelled thus in the framework); a brief description of Goal interaction; directionality (unidirectional or bidirectional); and identification of potential dependency factors underlying the linkage.

Regarding the 'type of interaction' category in Table 4.1, some examples clarify when an interaction is not clearly a synergy or trade-off. Many studies detected neutral linkages, i.e. where progress on one SDG had no apparent impact on another. Some, however, are defined by the authors as 'untapped synergies' because linkages can become positive if specific dependency factors are addressed. This is the case in the relationship between education and work outcomes for young people in Peru. In other cases, closely interrelated SDGs with some positive progress on the first goal could become synergistic, but are ultimately negative because of limited or no progress on the other. This is the case in Ghana, where limited adoption of clean fuels triggers negative health outcomes for households. Full implementation of clean energy would translate to positive progress in the health dimension.

This section includes an infographic (Figure 4.1) that summarises the findings category, as presented in Table 4.1.

Table 4.1. Matrix for cross-sectional analysis of synergies and trade-offs in country case studies

Country	Country case studies					
	Peru	Bolivia	India	Sri Lanka	Ghana	Nigeria
Approach						
Type	Mixed	Quantitative	Mixed	Mixed	Mixed	Quantitative
Methodology	Logistic regression (logit model)	Counter-factual simulations of joint density functions	Exploratory factor analysis, confirmatory factor analysis, structural equation modelling and textual analysis	Trend analysis, network mapping and interviews	Integrated benefit calculator of the LEAP model and focus groups for qualitative approach	Network analysis based on quantitative data and Spearman correlation analysis; qualitative literature review
Sources of data	Young Lives Survey, EAHO (household survey), ECE (education evaluations) and interviews	Time series of cross-sectional country household surveys	Primary data collection (questionnaire) and secondary data analysis (Census 2011; administrative data; PMKVY guidelines) (questionnaire) and secondary data analysis (Census 2011; administrative data; PMKVY guidelines)	Primary and secondary data collection through interviews	Various (Ghana Statistical Service indicators, and others)	Primary (in-depth interviews) and secondary (Nigeria demographic and health surveys)

Level of analysis	Individual	Individual	Household	Individual	Country, region & individual	Country
Contextual limitations mentioned by authors	Sample sizes in longitudinal survey, especially when considering specific populations	Limited data availability	Data scarcity	Data limitations and interview stigmas	Model has limitations for assessing social targets	Data limitation to measure education quality
Findings						
First SDG selected by the case study	4 (quality education)	4 (quality education)	4 (quality education)	8 (decent work and economic growth)	7 (affordable and clean energy)	4 (quality education)
Second SDG selected by the case study	8 (decent work and economic growth)	n/a	8 (decent work and economic growth)	n/a	n/a	n/a
S&T first pair	1 (no poverty)	4 (quality education)	4 (quality education)	8 (decent work and economic growth)	7 (affordable and clean energy)	4 (quality education)
	4 (quality education)	1 (no poverty)	5 (gender equality)	5 (gender equality)	3 (good health and well-being)	1 (no poverty)
Type of interaction	Synergy	Neutral	Neutral	Neutral	Synergy	Synergy
Interaction description	Lower socio-economic level is associated with being left behind in education	More schooling years do not explain poverty reduction	Level of education shows no correlation with women empowerment	Gender social norms reduce synergy effects for women	Polluting household fuels are an important cause behind air-pollution related deaths	Quality education leads to poverty reduction and this leads to greater access to education
Directionality	Bidirectional	Bidirectional	Bidirectional	Bidirectional	Unidirectional	Bidirectional
Possible dependency	PSCD: Characteristics of education	PSCD: Quality of education	PSCD: Social norms, quality of infrastructure and education	PSCD: Unpaid care and domestic chores; sexual harassment on public transport and workplace	Timeframe dependency	PSCD: Gender inequality
S&T second pair	5 (gender equality)	4 (quality education)	8 (decent work and economic growth)	8 (decent work and economic growth)	7 (affordable and clean energy)	4 (quality education)
	4 (quality education)	10 (reduced inequalities)	5 (gender equality)	4 (quality education)	5 (gender equality)	3 (good health and well-being)
Type of interaction	Neutral	Neutral	Neutral	Synergy	Synergy	Synergy
Interaction description	Girls do just as well or better at school but are likely to be left behind at work (untapped synergy)	More years of schooling do not explain income inequality reduction	Declining female labour force participation and limited access to decent work is associated with lower women's autonomy	Enhanced human capital increases productivity. However differential effects depending on the type of worker	Clean energy benefits women's health and frees some of their time	Quality of education increases awareness of and access to healthcare services
Directionality	Bidirectional	Unidirectional	Bidirectional	Unidirectional	Unidirectional	Unidirectional
Possible dependency	PSCD: Gender norms and unpaid work	PSCD: Quality of education	PSCD: Gender norms, safety and unpaid work	Engagement of private sector; adaptation to changing apparel industry	PSCD: Restrictive gender norms	PSCD: Gender norms

S&T third pair	4 (quality education)	4 (quality education)	n/a	8 (decent work and economic growth)	7 (affordable and clean energy)	4 (quality education)
	8 (decent work and economic growth)	8 (decent work and economic growth)	n/a	12 (responsible consumption and production)	13 (climate action)	5 (gender equality)
Type of interaction	Synergy, but not tapped for all groups	Limited synergy	n/a	Trade-off	Synergy	Synergy
Interaction description	Being left behind in education is associated with being left behind in decent work	More years of education make only minor contribution to labour earnings, especially for men	n/a	Economic growth causes wasteful consumption	Clean energy reduces greenhouse gas emissions	More gender-equal norms remove barriers to girls' access to education, and quality education helps deconstruct unequal norms
Directionality	Unidirectional	Unidirectional	n/a	Unidirectional	Bidirectional	Bidirectional
Possible dependency	Quality education and economic autonomy keys to untap synergy	Low labour demand for highly-skilled workers	n/a	Governance	Time frame	Place-specific context
S&T fourth pair	n/a	n/a	n/a	n/a	7 (affordable and clean energy)	4 (quality education)
	n/a	n/a	n/a	n/a	15 (life on land)	8 (decent work and economic growth)
Type of interaction	n/a	n/a	n/a	n/a	Neutral	Synergy
Interaction description	n/a	n/a	n/a	n/a	Life on land improves without clean energy	Enhanced human capital increases productivity
Directionality	n/a	n/a	n/a	n/a	Bidirectional	Unidirectional
Possible dependency	n/a	n/a	n/a	n/a	n/a	PSCD: Stage of economic development

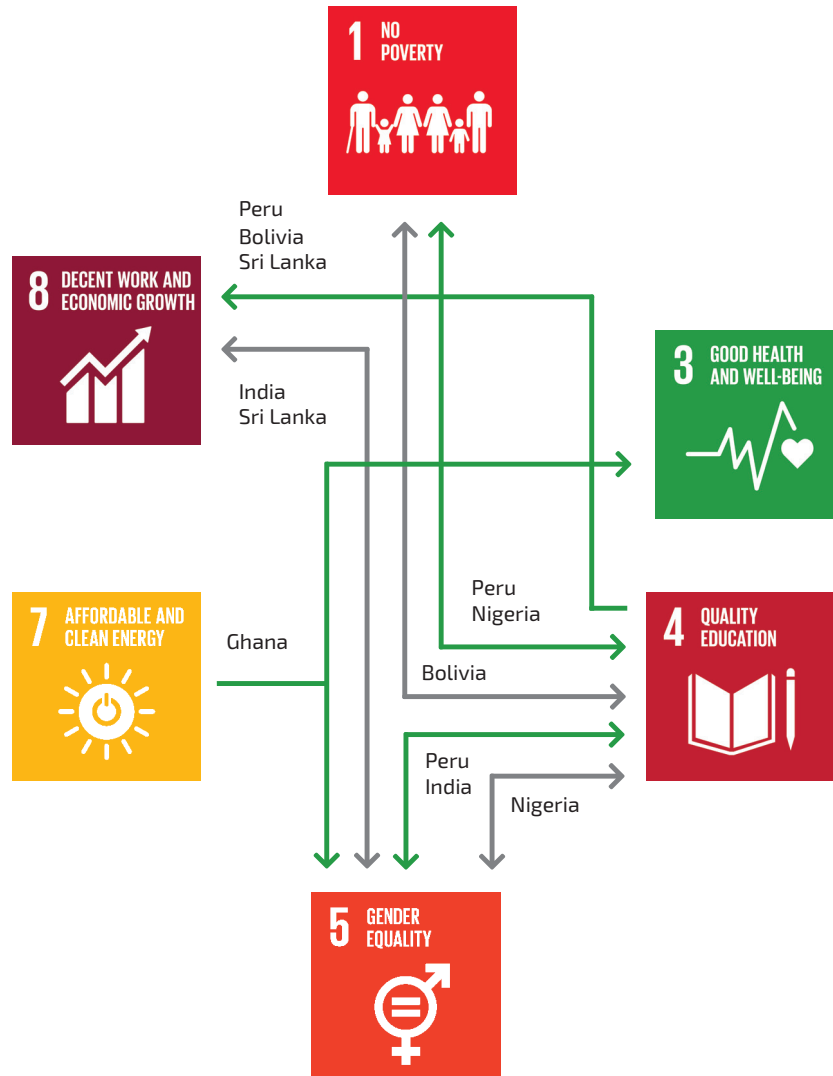
Note. N/a=not applicable (used in cases where only two or three SDG pairs were analysed for synergies and trade-offs). PSCD=place-specific context dependency. Matching colours identify matching pairs of SDGs (dyads which will be analysed together in the following section).

Source: Adeniran, Onyekwena, Onubedo, Ishaku & Ekeruche (2020); Nair, Shah & Sivaraman (2020); Obrumah Crentsil, Pokuaa Fenny, Ackah, Asuman & Otiekue (2020); Andersen, Medianceli, Maldonado & Hernani-Limarino (2020); Alcázar, Bullard & Ballarin (2020); Fernando, Arambepola, Niles & Ranawana (2020).

Compiled by the authors.

Figure 4.1 (below) visually synthesises the findings category in the Table 4.1 and presents the six main SDGs chosen for in-depth analyses. Arrowheads denote directionality. An arrow on both ends of a line indicates a bidirectional interlinkage, whereas an arrow on only one end indicates a unidirectional relationship, as well as its precise direction. Colours indicate whether the relationship is synergistic (green), neutral (grey) or a trade-off (red). Labels identify which SDG pair is present in which country study.

Figure 4.1. Infographic presenting a visual summary of the findings section in Table 4.1.



Note. As shown in Table 4.1, no trade-offs were found in the SDG groups selected for in-depth analyses. This is why there are no red arrows in the infographic. Compiled by the authors.

SDG interlinkages in country contexts: findings in focus

This section contextualises and assesses the five SDG pairs selected for an in-depth comparison. It begins with a brief literature review of each case, focussing both on SDG-specific research and on insight from the broader policy area, before outlining findings from the cases. Although most synergies are well-known both in developed and developing countries, specific circumstances sometimes prevent them from emerging. Consequently, it is important to identify dependency factors to determine the specific policy responses necessary to promote coherence and profit from synergies.

SDGs 4 (quality education) and 1 (no poverty)

State of knowledge

Alleviating poverty requires universal and inclusive access to basic resources and social protection systems (FAO, 2015). Providing inclusive and quality education is one of the most powerful and proven tools for sustainable development (World Bank, 2018). However, educational progress in some developing countries is hindered by poverty, armed conflict, and emergencies. Measuring if poverty impedes education, or if education helps alleviate poverty, is useful in determining whether SDGs 4 and 1 are in synergy or introduce trade-offs.

Oxaal (1997) understands the relationship between education and poverty in two ways: education as reducing poverty in the long term, or poverty as constraining educational achievement. Education as a poverty reduction strategy is usually analysed at the individual and country level. Individually, education provides valuable skills and knowledge that can reduce income poverty by increasing the wages of a more qualified labour force (Hanushek, 2013). Granting universal access to education—one dimension of multidimensional poverty—decreases personal deprivation. Evidence shows that education brings resilience, empowers individuals, and aids individual, household, and community development (United Nations Educational, Scientific and Cultural Organization [UNESCO], 2017).

Macroeconomically, education is recognised to reduce income inequality. A study conducted by the United Nations Children's Fund (UNICEF, 2015) of 114 countries from 1985-2005 revealed that one extra year of schooling reduces the national Gini coefficient by 1.4 percentage points. UNESCO (2017) has argued that nearly 60 million people could escape poverty if everyone 15 years old and over had just two more years of schooling.

Poverty as a constraint on educational achievement can be analysed at the macro- and micro-level. Macroeconomically, lower-income countries generally show lower levels of enrolment and fewer average years of education (UNESCO, 2017). Microscopically, children living in poor households usually receive less education than in richer households. For infants, this can create gaps in cognitive and language development (Rubio-Codina & Grantham-McGregor, 2019). This implies a violation of children's rights, and is detrimental to their skills development, negatively affecting life trajectories (Cecchini, Filgueira, Martínez & Rossel, 2015).

Reducing poverty (SDG 1) would help reduce barriers affecting education; investment in quality education (SDG 4) would have a positive impact on poverty reduction. This indicates that while SDGs 1 and 4 are goals in themselves, there is also space for bidirectional synergies.

The strong synergy here has also been addressed by Agenda-specific literature. Pradhan et al. (2017) quantitatively analysed SDG synergies, identifying positive or negative correlations, from indicators developed by the Inter-Agency and Expert Group on SDG Indicators, using the nonparametric Spearman's rank correlation analysis. Their findings



Quality education helps to relieve poverty by increasing people's income and resilience, benefiting minorities and preventing intergenerational transmission of poverty.

reveal that SDGs 1 and 4 have significant synergistic relations, ranking second in the top 10 synergy pins, eclipsed only by SDGs 11 and 13 (Sustainable Cities and Communities, and Climate Action). Le Blanc (2015) ranked SDG 1 as possessing the third-most linkages with other Goals.

Vladimirova and Le Blanc (2016) studied the relationship between SDG 4 (quality education) and others. Analysing 37 global reports produced by United Nations organisations, the authors found that education is recognised as facilitating other SDGs. They also argue that there are endogeneity issues with the link between SDGs 4 and 1 (no poverty). Quality education helps to relieve poverty by increasing people's income and resilience, benefiting minorities and preventing intergenerational transmission of poverty. This positive impact can be constrained by limited educational access and rising educational requirements for labour market entry. However, poverty reduction also improves education by diminishing differences in service quality accessible to people with different incomes. Nonetheless, the study noted children from lower-income backgrounds likely receive less, and worse, educational services than those from higher-income households.

Although compelling, this evidence does not causally link SDGs 1 and 4 to explain this synergy. More research is needed on the synergies and trade-offs of specific policy interventions. The methodology developed by Mainali et al. (2018), using a mixed approach and historical data, offers a good starting point for analysing the relationship between four SDGs. One goal this research focuses on is SDG 1 (no poverty), which was found to have strong synergies with other SDGs. The study concludes that the potential for synergies and trade-offs is context-specific, and depends on policies to emphasise those linkages.

Insight from Peru, Bolivia, and Nigeria

The Peruvian, Bolivian, and Nigerian case studies each analyse the synergies and trade-offs between SDGs 1 (no poverty) and 4 (quality education).

In the Peruvian case, Alcázar, Bullard & Ballarin (2020) find potential for a strong synergy between SDG 4 (quality education) and 1 (no poverty) at the individual level. Occupying the lowest income quintiles was an important variable predicting poor educational indicators among adolescents and young adults. Primary students living in poverty were 5% more likely to lag in reading scores and 16.1% more likely to lag in mathematics. Students from the lowest socio-economic levels in secondary school were 10.2% more likely to lag in reading and mathematics (Alcázar et al., 2020).

The strong relationship between poverty and access to education is linked to barriers to accessing decent work later in life (Alcázar et al., 2020), which can reproduce income poverty and reduce economic autonomy. The relationship between education and poverty is frequently bidirectional. Barriers in one dimension create negative outcomes in the other. The Peruvian case shows these effects have an intergenerational dimension; children with lagging educational outcomes frequently have poor parents who faced educational access barriers when young. (Alcázar et al., 2020).

The association between education and poverty means that policies designed to address either can have cascading effects. Peruvian case evidence suggests that evidence-based policy reforms targeting one Goal will produce positive effects on the other. Some place-specific context dependencies should be taken into account in education policies to ensure that reforms successfully address barriers preventing vulnerable groups from accessing education. These include: proper assignment of resources and quality infrastructure to strengthen learning environments (including access and transportation considerations, especially in rural regions), policies with socio-educational components to bolster individual trajectories, and synergies between school and care facilities.

In Bolivia, income poverty has significantly decreased in the past 15 years (Andersen et al., 2020). However, the case study shows that educational gains (measured in additional years of education) in the 1999-2014 period have not contributed to reducing extreme or monetary income poverty (Andersen et al., 2020). An apparently neutral relationship between the two policy dimensions and SDGs exists where a synergy was expected. These results are striking. The authors suggest that, given that Bolivian educational investment is amongst the highest in South American countries (an average 7% of its gross domestic product [GDP]), this neutral linkage could even become a trade-off if those resources could have been used more efficiently (Andersen et al., 2020).

However, this analysis focuses on years of schooling rather than on quality, which is also a key characteristic of SDG 4. Quality is one major difference between the Millennium Development Goal (MDG) and SDG education targets. A synergies and trade-offs analysis that does not include educational attainment and results is inherently limited, and prevents consideration of why education length does not contribute to a reduction in monetary poverty. The Bolivian case study illustrates this issue, lacking data on the quality of education nationally (Andersen et al., 2020). It is impossible to know whether this lack of significant contribution from education to poverty reduction can be traced back to education itself or to challenges regarding its quality and relevance (Hanushek, 2013). Quality is therefore a probable space-specific context dependency factor in this case. Problems related to poverty measurement are also important to contextualise the findings, including the exclusion of data on family production and auto consumption in the latest income poverty headcounts (Andersen et al., 2020).

In Nigeria, Adeniran et al. (2020) corroborate the close interrelationship between poverty and education. The authors categorise the interaction between poverty eradication and quality education as 'indivisible'; progress on one goal simultaneously affects progress on another (Adeniran et al., 2020). They conclude that higher quality education leads to poverty reduction. But higher incomes also lead to higher quality education, in a virtuous cycle that reduces the intergenerational transmission of poverty (Adeniran et al., 2020). The authors also note a dependency factor: gender inequality. Social norms may prevent young girls from going to school (Adeniran et al., 2020).

In conclusion, the Bolivian, Nigerian, and Peruvian cases suggest synergies between SDG 1 and 4, consistent with international evidence

and literature. The Peruvian case illustrates a positive relationship between poverty reduction and quality education at the individual level but notes an impact disparity between different socio-economic sectors. In Bolivia, the missing link between education length and poverty reduction could be explained by a methodological bias; data related to family production in the measurement of poverty and to education quality is lacking. Finally, the Nigerian case evidences synergies between SDGs 1 and 4, which are 'indivisible' according to the authors.

SDGs 4 (quality education) and 5 (gender equality)

State of knowledge

Gender inequalities in education have diminished globally, but girls still face discrimination and gendered gaps in primary, secondary, and tertiary education. This is one factor preventing women's full participation in the labour market. For instance, in North Africa, only 1 in 5 women hold non-agricultural jobs. Globally, women hold more than 30% of seats in at least one chamber of the national parliament in only 46 countries (United Nations, 2019a). The synergy between SDGs 4 and 5 can encourage the participation of women and girls in all political, economic, and public spheres, providing real opportunities for autonomy.

The UNESCO Resources on Gender Equality (2019) regarding SDGs for educators establish the importance of education for gender equality. During early childhood, children learn to cohabit with other genders; in primary school, they learn the impact of gender roles on identity and equal treatment. In secondary school, this understanding expands to the social construction of gender, including gendered roles, professions, sports, and households. This has enormous consequences on their development. Home, school, and professional gender stereotypes have important implications on educational outcomes (Díaz Langou, De León, Florito, Caro Sachetti, Biondi, & Karczmarczyk, 2019). Addressing gender inequalities from a young age would reduce horizontal segmentation in higher education and the labour market later in life.

Quality education that mainstreams gender considerations can greatly contribute to gender equality, expanding opportunities and raising aspirations for work outside the house (United Nations Population Fund [UNFPA], 2014; World Bank, 2007). It empowers women to fight against discrimination and for their rights (UNESCO, 2013-2014; UNDP, 2010). In particular, comprehensive sex education has positive impacts on girls' and women's education levels and independence (Montgomery & Knerr, 2018; UNESCO, UNAIDS, UNFPA, UNICEF, UN Women & WHO, 2018).

Despite these positive correlations, synergies can be diminished by implicit social norms, biases, and stereotypes, preventing highly educated societies from achieving gender equality (Díaz Langou et al., 2019). For quality education to improve gender equality, it is important to include a gender perspective aimed at minimising discrimination (UNESCO et al., 2018). Moreover, quality education and gender equality can address gender norms and discrimination that see fewer girls than boys attend rural schools (UNESCO & UNICEF, 2015; FAO, 2015).

From a 2030 Agenda perspective, the literature illustrates correlations and synergies between quality education (SDG 4) and gender equality (SDG 5). Pradhan et al. (2017) note this, although SDGs 4 and 5 were below the top 10 synergy pairs. Le Blanc (2015) ranked all Targets by linkages with other Goals and found that SDGs 4 and 5 ranked 8th and 7th, respectively, including several linkages between each other.

Vladimirova and Le Blanc (2016) also demonstrate synergies between SDGs 4 and 5. United Nations global reports show quality education can improve opportunities for girls and young women by raising their aspirations and promoting paid work outside the household. Moreover, higher educational attainment for girls can positively change gender norms. They also analyse the impact that gender equality progress has on education. Through reducing early marriage and promoting sexual and reproductive rights, gender equality lowers barriers that marriage or pregnancies place on women's education. Older women's economic empowerment can also boost household income, improving children's school attainment. That this is a long-term process is identified as a challenge; the impact of education can remain low while these negative stereotypes and practices still exist. Vladimirova and Le Blanc show that including a gender perspective in policy implementation, including affirmative action around school attainment and gender-sensitive teaching can mitigate these challenges.

In conclusion, although the studies suggest there are synergies between quality education and gender equality, most of the evidence is not context specific. Which specific policies work in each context to bolster links and progress the Agenda requires greater study.

Insight from Nigeria, India, and Peru

The Nigerian, Indian, and Peruvian case studies each analyse synergies and trade-offs between SDGs 4 (quality education) and 5 (gender equality).

In Nigeria, Adeniran et al. identify strong synergy between education access and gender equality. Education improves women's autonomy, reproductive and sexual rights, household decision making, and job opportunities (Adeniran et al., 2020). There is a consensus that this relationship is bidirectional. Moreover, improving access to education reduces child marriage, a widespread practice harmful to girls' rights and future prospects.

In India there are untapped synergies between SDGs 4 and 5. The research illustrates potential links between targets 4.3 (ensuring equal access for all women and men to affordable quality technical, vocational, and tertiary education), 4.4 (increasing the number of youth and adults who have relevant skills for employment, decent jobs, and entrepreneurship), and 4.5 (eliminating gender disparities in education and ensuring equal access to all levels of education and vocational training for the vulnerable), with target 5.5 (ensuring women's full and effective participation and equal opportunities for leadership at all levels of decision making in political, economic, and public life).

Two policy challenges impair guaranteeing these synergies. First, training centres lack adequate infrastructure, such as childcare



Quality education can improve opportunities for girls and young women by raising their aspirations and promoting paid work outside the household.

services, accessible transportation, or appropriate equipment, deterring women's participation in training schemes (Nair et al., 2020). Second, training schemes fail to provide women with relevant skills; and attaining higher education does not correlate with higher economic participation for Indian women (Nair et al., 2020). Education is perceived more as a status symbol than employability enhancer (Nair et al., 2020), increasing the probability that women will be left behind.

The research also highlights potential synergy between SDG 4 and target 5.A (undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance, and natural resources, in accordance with national laws). For this to be realised, training should provide financial education that provides women with money management skills (Nair et al., 2020).

In Peru, Alcázar et al. (2020) find a neutral linkage, where a synergy is expected, between SDG 4 and the economic autonomy targets in SDG 5. Although girls do just as well or better at school than boys, they are much more likely to be left behind in the labour market (Alcázar et al., 2020). Harmful gender norms in adolescence portray women as less skilled in specific areas such as science, technology, engineering, and mathematics (STEM); it is harder for girls to see themselves in these careers and this can cause poorer academic performance in those subjects (Spencer, Steele, & Quinn, 1999). Even when academic performance at school is not significantly gendered, this does not hold in labour market participation. Peruvian women are 10.7% more likely than men to be neither in employment, education, or training (NEET) and 12.5% more likely to work in precarious conditions (Alcázar et al., 2020).

Other contextual factors, including unfair distribution of care responsibilities, prevent young Peruvian women profiting from the intuitive synergy between SDG 4 and gender economic autonomy targets in SDGs 5 and 8 (decent work and economic growth). Progress towards all SDG 5 targets (especially 5.1, 5.4, and 5.6, related to discrimination, care work, and sexual and reproductive health rights), would help realise this synergy (Díaz Langou et al., 2019).

In conclusion, knowledge and evidence show a potential synergy between SDGs 4 and 5. Quality education for women and girls should contribute to their empowerment and reduce gender inequalities. More gender equal countries are likely to provide better education opportunities for women. The three country cases confirm this potential synergy, but the Indian case highlights how women's access to training has not led to more economic autonomy. As noted before, the impact of quality education on gender equality depends upon deconstructing harmful gender norms through mainstreaming the gender perspective.

SDGs 8 (decent work and economic growth) and 5 (gender equality)

State of knowledge

Women's growing labour force participation since the mid-20th century has had positive outcomes for gender equality. However, women are more likely to work in worse paid sectors, lower-level positions, and the informal economy, contributing to the gender pay gap (Díaz Langou et al., 2019).

The relationship between economic growth and gender equality has long been researched. Goldin (1995) sees this relationship as U-shaped: women's labour market participation is high in low-income contexts, but decreases when new technologies and economic growth replace women's paid work with non-paid household work. Participation rises again when female education increases, fertility rates lower, and marriage and childbearing are delayed (World Bank, 2012). Implicitly based on a male breadwinner model where women's work complements men's, these predictions may not hold in more gender-equal societies.

Gender gaps are also evident, but less significant, in high-income countries; women remain overrepresented in low-paying occupations and under-represented in the top income groups (Atkinson, Casarico, & Voitchovsky, 2018). While economic growth contributes to gender equality, specific policy interventions accelerate the process. The World Economic Forum's Global Gender Gap Report (2017) states that, without changes in current trends, it would take 100 years to close the global gender gap.

Duflo (2012) concludes that economic development alone is insufficient to resist pervasive stereotypes and improve key dimensions of women's empowerment. Nonetheless, this empowerment is essential from a human rights perspective. Affirmative action towards this Goal can contribute to maximising the impact economic growth has on gender equality.

There is consensus a positive correlation exists between gender equality, decent work, and economic growth (Díaz Langou & Brest, 2018). McKinsey Global Institute (2015) notes that annual global GDP could be 60% higher by 2025 if women's labour force participation were equal to men's. Macroeconomically, gendered labour gaps slow economic growth because talent pools are underutilised and human talent is underinvested in (Booz & Company, 2012; Blackden, Canagarajah, Klasen, & Lawson, 2006). Bertay, Dordevic, and Sever (2018) hypothesised that reducing gender inequality should disproportionately benefit female-dominated industries. There is evidence that more diverse workspaces contribute to better outputs and productivity, and that higher female participation has positive impacts on firms' economic performance (International Finance Corporation, 2015; Credit Suisse Research Institute, 2014; Cuberes & Teignier-Baqué, 2011a; Cuberes & Teignier-Baqué, 2011b).

Equally compelling evidence shows women's access to jobs, cash transfers, education, credit, land, and other assets aids poverty



Under some circumstances, economic growth can create synergies with gender equality but should be combined with affirmative action policies to prevent trade-offs arising.

reduction, fertility decline, children's welfare and agricultural productivity (Barrientos & DeJong, 2006; Blumberg, Cooper, & Schindler, 2005; Kabeeer, 2003; Quisumbing & Mallucio, 2003). However, extant gender discrimination in access to jobs, education, health, and political representation all testify to the persistence of gender inequalities in life choices and chances.

The potential synergy identified between SDGs 5 and 8 is consistent with existing scholarship. Pradhan et al.'s (2017) study reveal that, despite synergies between SDGs 5 and 8, negative statistical correlations exist. Miola, Borchardt, Neher, and Buscaglia (2019) analyse synergies and trade-offs between SDGs; while SDG 5 has almost no trade-offs with other SDGs, SDG 8 has room for possible trade-offs.

Benson Wahlen (2017) analyses the link between gender equality and other SDGs. Gender equality, she argues, is an "enabler and accelerator" for all other SDGs. The first target (ending all forms of discrimination against women and girls), enables equal and decent education and labour market access. Moreover, the promotion of economic empowerment and financing has direct implications for economic growth: ensuring women's economic rights increases labour market participation and boosts productivity, especially when women's leadership is encouraged. The report also highlights the positive impact on economic activity that women's good health has. Despite these positive linkages, Benson Wahlen (2017) identifies two implementation challenges: the absence of gender-sensitive data; and insufficient investment on gender equality.

Potential synergies between decent work, economic growth and gender equality would clearly be positive. Advancing gender equity would reduce obstacles to female empowerment and enable women's full, and positive, labour market participation. Under some circumstances, economic growth can create synergies with gender equality but should be combined with affirmative action policies to prevent trade-offs arising.

Insight from Sri Lanka and India

The Sri Lankan and Indian SVSS case studies analyse the synergies and trade-offs between SDGs 8 and 5.

Sri Lanka has seen major advances toward specific SGD 5 targets. Maternal health, female literacy rates, and educational attainment at all levels have improved (Fernando, Arambepola, Niles & Ranawana, 2020). However, women's labour market access and employment quality are not yet prioritised. This is particularly problematic because automation—notably in the apparel industry—is transforming the traditional world of work (Fernando et al., 2020).

Sri Lanka's female labour force participation rate remains low. Only 34% of women work, a figure consistent over several years (World Bank, 2018). Unresolved childcare demands, and serious sexual harassment on public transport and in the workplace, thwart women's full participation in the labour force (Fernando et al., 2020). Women who nonetheless work face lower salaries and become concentrated in less dynamic sectors of the economy (Fernando et al., 2020).

This compromises the SDG 8 equality principle and the possibility of achieving SDG 5. Limited access to better work becomes a reinforcing dynamic that mutually compromises their economic autonomy, household power, and human rights (Benavente & Valdés, 2014). That low incomes prevent women from hiring professional care services to, in turn, participate in the labour market illustrates that this relationship is bidirectional (Fernando et al., 2020).

In India, certain workforce sectors are increasingly feminised (Nair et al., 2020). Women are typecast into jobs reproductive of sexual divisions of labour, such as caregivers and educators. They are also overrepresented in the informal economy, which prevents their access to social protection. Together with declining female labour force participation, these outcomes reinforce the challenges of creating a virtuous cycle between SDGs 5 and 8. Higher education does not translate into better job opportunities for women: university graduates and middle-school dropouts register similar activity levels (Nair et al., 2020). This may be because skilling schemes training does not match labour market needs, or because women do not know about training options.

Guaranteeing decent work opportunities for women could certainly foster gender equality. The Indian case study argues that providing access to formal jobs, which guarantee parental leave schemes and access to basic infrastructure, can have a significant effect on women who are not currently working (Nair et al., 2020). Yet, as described, women are mostly employed in the informal economy and face obstacles related to workplace infrastructure deficiencies, transport safety, and lack of agency.

The case studies and the previous literature review illustrate synergies between decent work, economic growth, and gender equality. Economic growth alone is insufficient to guarantee gender equality, especially in the labour market. Moreover, like India and Sri Lanka's case studies show, advances in literacy rates and educational attainment do not necessarily cause better working conditions for women.

SDGs 8 (decent work and economic growth) and 4 (quality education)

State of knowledge

Education positively impacts economic growth and facilitates decent work through different mechanisms: human capital, technology, productivity, and exports. For Mankiw, Romer, and Weil (1992), education increases human capital, which is inherent to the labour force in the augmented neoclassical model. It also increases the transmission of technology (Nelson & Phelps, 1966; Benhabib & Spiegel, 1994) and an economy's capacity to innovate new processes, technology, and products (Lucas, 1988; Romer, 1990; Aghion & Howitt, 1998). Some studies emphasise the impact of education, particularly at the secondary and tertiary levels, on workers' productivity, arguing this produces higher earnings, better working conditions, and knowledge spillovers that promote entrepreneurship and growth (World Bank, 2007).

In contrast, Hanushek (2013) argues that there is an oversized preoccupation with school attendance and completion in developing countries, while school quality and cognitive skills are underestimated. Conversely to the focus of education access, participation, and enrolment in the MDGs, the SDGs focus on quality and learning outcomes, endorsing their positive correlation with economic growth (OECD, 2016b).

Educational gaps between developed and developing countries, especially in terms of literacy, school attendance, and university enrolment, illustrate the importance of decent work and economic growth (UNESCO, 2017). Educational quality data is scarcer, because this is a multidimensional issue involving students, professors, infrastructure, political will, and budgets. Jaureguiberry, López, and Zoido (2018) found that Latin America's investment in education, although increased over the past decade, is still less than the OECD average—especially in secondary and tertiary sectors. The authors argue more, better, and more efficient investment is required. This evidence reinforces that economic growth can contribute to quality education by boosting investment, but is insufficient to guarantee universal educational access independently.

Consequently, both synergies and trade-offs between these two SDGs are possible but this depends on policy implementation in each country. While universal education improves the skills and qualifications of future workers, economic growth and decent work do not necessarily conversely lead to a better education.

In Le Blanc's (2015) classification of SDG interlinkages, SDG 8 was ranked fourth, and SDG 4 eighth. While the author identifies a connection between these two Goals, there are fewer total interlinkages compared to other pairs of SDGs. This illustrates that synergies or trade-offs depend upon the form public interventions take.

Vladimirova and Le Blanc (2016) review United Nations reports and analyse the relationship between quality education and economic growth, finding education increases workers' productivity and income. Secondary and tertiary education promote knowledge spillovers and entrepreneurship; skilled labour can, in turn, increase exports and investment. Additionally, economic growth creates a higher demand for skilled workers, technological innovation, and 'green skills'. The increased household income produced by economic growth can also reduce child labour and improve children's access to education, especially for girls. However, constraints and challenges may create trade-offs, such as a growing gap between the skills traditional education provides and those the job market requires. Unpaid household work reduces women's available time for education and labour market participation. The authors propose policy interventions, including higher education investment, raising education attainment outcomes, facilitating school-to-work transitions, and incentivising skills development.

In conclusion, despite considerable scholarship that suggests a positive relationship between economic growth, decent work, and quality education, studies dedicated to the synergies and trade-offs in these contexts are scarce. This has important consequences for SDGs

4 and 8 given scholars suggest that potential synergies could easily become trade-offs if not accompanied by efficient public policies. Specific and contextual research would contribute to closing this gap and help policymakers promote synergies and minimise trade-offs.

Insight from Nigeria, Sri Lanka, Peru, and Bolivia

The Sri Lankan, Peruvian, Bolivian, and Nigerian case studies analyse synergies and trade-offs between SDGs 4 and 8.

Robust evidence in Nigeria has found a close relationship between quality education, decent work, and economic growth. Proficiency in reading and basic mathematics and the labour supply quality are positively linked. Educational attainment fosters interest in labour market participation at individual and aggregate levels, particularly in women and young people (Adeniran et al., 2020). However, this interlinkage is conditional on other factors. Labour market opportunities and gendered social norms, for instance, might preclude women's educational attainment translating into more secure and better-quality jobs (Adeniran et al., 2020).

In Sri Lanka, there is evidence that the strong link between educational attainment and decent work is conditional on the type of activities workers perform. Skills development leads to improved working conditions and remuneration, but this synergy is stronger for non-routine cognitive workers than for manual workers (Fernando et al., 2020). Advances in automation transforming the apparel industry reduce private sector incentives to hire and develop low-skill workers, in turn affecting training policies for vulnerable groups. A key insight of Fernando et al.'s study is that synergies and trade-offs are not black-and-white. Two SDGs, or even two specific targets, might have a positive and negative relationship at the same time, depending on the population studied (Fernando et al., 2020). For male citizens, skilling programmes related to SDG 4 may positively influence job opportunities expressed in SDG 8. However, this might widen the gap between workers who cannot access these programmes, particularly women responsible for childcare.

Interlinkage between SDGs 4 and 8 in Peru has been identified by Alcázar et al. (2020). This is a strong unidirectional synergy. Progress in education is associated with better individual outcomes in the labour market. Using the Young Lives (YL) longitudinal data, the authors indicate that Peruvians left behind in mathematics or reading in childhood and adolescence are likely to be in a NEET situation at 22 years old (Alcázar et al., 2020).

The authors note that several dependency factors, including quality education, is an aspect of SDG 4 intrinsically connected with labour market outcomes later in life. Interventions to improve learning outcomes, rather than only attendance, are therefore critical to ensure that positive changes in education mutually reinforce decent work. The apparent 3.2% reduction in probability of precarious work each additional year of education seems to disappear when educational quality is considered in Peru (Alcázar et al., 2020).

A synergistic relationship between quality education and decent work does not emerge automatically in all circumstances. As the Peruvian



Advances in automation transforming the apparel industry reduce private sector incentives to hire and develop low-skill workers, in turn affecting training policies for vulnerable groups.

case shows, there is an important gendered dimension to this SDG interlinkage. Women are more likely to be neither in employment, education, or training, which is a common scenario throughout the region. This circumstance obscures that these young women shoulder a great burden of unpaid care and domestic work (De León, 2017). Indigeneity and rural contexts are also important place-specific context dependencies, particularly because of their impact on work indicators (Alcázar et al., 2020).

In Bolivia, the synergy between SDGs 4 and 8 is more limited. Andersen et al. (2020) show through simulations that additional years of education would only modestly contribute to mean and median labour earnings: 390 and 277 PPP dollars, respectively. The counterfactual simulations also show that if schooling distribution is kept constant, the share of 'good' and 'living' jobs⁴ available would not have changed (Andersen et al., 2020). This is consistent with the mixed evidence about the impact of education on labour demand.

The Bolivian case facilitates a detailed focus on the relationship between education and wages for workers with varying levels of educational attainment. Gender is an important variable. Women's wages increase significantly with higher education levels. For instance, young women who studied for 12 to 15 years have hourly wages 63% higher than women who studied for less than six years (Andersen et al., 2020). In contrast, the wage distributions for groups of men with zero to five, six to 11, and 12 to 15 years of education are almost the same, with the last level only helping very low wage occupations. Higher education, however, is very beneficial for men (a 79% increase in wage level) (Andersen et al., 2020). The group that benefits the least from longer stays in the Bolivian education system is young, urban, non-indigenous men. Wage levels only jump after 16 years of education (Andersen et al., 2020).

These outcomes suggest a very challenging scenario for synergy between SDG 4 and 8, which is limited by one main dependency factor: labour market dynamics. The Bolivian labour market favours cheap manual labourers, such as construction workers, maids, and mining workers (Andersen et al. 2020). Highly educated university graduates work for free as interns in limited workplaces requiring highly-skilled workers. The authors connect this to global economic forces; the Bolivian economy has specialised in unprocessed primary exports with low added value so growing sectors in the labour market (like construction) reward on-the-job experience rather than formal schooling (Andersen et al., 2020). Not until this is addressed will the synergies between SDG 4 and 8 increase significantly for all kinds of workers.

⁴ 'Good' jobs correspond to those providing enough earnings to cover two international poverty lines. 'Living' jobs, on the other hand, provide enough earnings for only one international poverty line (Andersen et al., 2020).

In conclusion, it is crucial to restate the broad consensus that better education does facilitate economic development. The Nigerian and Peruvian cases support this. However, the effect can be hindered by harmful gender norms, as shown in the Sri Lankan case. Therefore, the mainstreaming of a gender perspective in education is important. The case of Sri Lanka also highlights the importance of connecting education with labour demand, since low-skilled workers benefit less from education in the labour market. Bolivia's case shows remarkable differences in the welfare of its general and indigenous population;

when median incomes rise, wealth distribution effects negatively affect education and economic growth for some groups. However, the Bolivian case study analyses education only through years of schooling, which cannot account for its quality.

SDGs 7 (affordable and clean energy), 3 (good health and well-being) and 5 (gender equality)

State of knowledge

The 2030 Agenda strongly promotes long-term environmental sustainability, on account of evidence that current production and consumption trends damage the environment and social well-being. Seven of 17 SDGs directly reference environmental issues,⁵ and despite the consensus on their urgency, the environmental component of sustainable development remains hard to achieve due to its relationship with the current system of production and distribution. This lack of coherence affects synergies between SDGs: according to Pradhan et al.'s (2017) statistical analysis of SDGs, all of the top 10 trade-off pairs are integrated by SDG 12 (responsible consumption and production) or 15 (life on land). In order to achieve policy coherence, the current paradigm of consumption and production must be challenged.

SDG 7 promotes access to affordable and clean energy. The 2030 Agenda posits that guaranteeing this would contribute to other Goals, such as reducing climate change, technological innovation, human health and well-being, and environmental protection (UNDP, 2015). According to the World Health Organization (WHO), clean energies also contribute to good health and well-being. 3.8 million people die each year for reasons related to air pollution and inefficient use of solid fuel.⁶ This specifically affects the most vulnerable social groups, who struggle accessing cleaner forms of energy. Energy systems are supported by a diverse array of workers who are physically exposed to pollution on a daily basis and suffer greater health risks (Wang, 2015).

Renewable and efficient energy choices help to displace emissions from fossil-fuelled electrical generating units (EGUs) (Buonocore, Luckow, Norris, Spengler, Biewald, Fisher & Levy, 2015). Some regions in the United States would save up to between USD 5.7 million and USD 210 million per year in health- and climate-related costs, depending on which renewable energy options are installed. This positive correlation is also evident in the way SDG 3 itself is framed. Target 3.9 aims to reduce the incidence of death and illness from air pollution and contamination, and target 3.9.1 aims to reduce mortality rates from household pollution.

UN Women reports that women and girls accounted for 60% of 4.3 million premature deaths caused in 2012 by indoor air pollution, due to the amount of household work they are responsible for. Girls and women would benefit greatly from affordable and clean energy, in health and non-health outcomes. A brief by Shankar (2015) for the Global Sustainable Development Report emphasises the role cleaner energy options have in freeing up more time for women and girls to study.

5 SDG 6 focuses on clean water and sanitation, SDG 7 calls for affordable and clean energy, SDG 11 stresses the need for sustainable cities and communities, SDG 12 is responsible consumption and production, SDG 13 calls for climate action, and SDGs 14 and 15 are related to life on water and land.

6 27% of the above die of pneumonia, 18% from stroke, 27% from ischaemic heart disease, 20% from COPD or Chronic Obstructive Pulmonary Disease, and about 8% from lung cancer (WHO, 2016).



There are several areas for synergies among affordable and clean energy, good health and gender equality.

In addition to the above synergies, the promotion of good health and well-being and gender equality are also positively correlated. This is especially true when health is understood comprehensively to include physical, social, and psychological dimensions (WHO, 2006). According to UNDP, more than one in three women globally have experienced physical or sexual violence. Sexual and reproductive health rights in developing countries are limited and poorly enforced, affecting access to contraceptive methods, information regarding safe and consensual sexual practices, and maternal mortality. Lastly, the expanding gender agenda has reduced biases that influence how women are medically diagnosed and treated. Research has recently identified that symptoms of heart attacks are different for men and women, which can lead to incorrect diagnoses and negative health outcomes (Tomaszewski, Topyla, Kijewski, Miotla & Wacinski, 2019). In sum, the literature review indicates that the promotion of affordable and clean energy in fact also promotes good health and gender equality, and that there are several areas for synergies among them. These findings are also supported by the specialized literature on synergies and trade-offs among SDGs.

The International Council for Science (2017) argue that SDGs 3 and 7 are strongly positively correlated—particularly for urban residents. The length of time needed to observe the results, challenges related to geographical diversity, the need for strong political will during implementation, and dependence on specific technology all affect the realisation of this synergy. As for the link between SDGs 7 and 5, their study detects an overall synergy. It adds that, since women are mostly responsible for domestic work, they are directly positioned to gain from cleaner and more accessible energies when performing these tasks (notwithstanding that this burden ought to be redistributed between the genders in accordance with SDG 5).

The International Council for Science (2017) also studies the relationship between good health and gender equality, observing a synergy. Gender equality, they argue, contributes to prioritising women's health issues, which can indirectly improve child health outcomes. Pradhan et al.'s (2017) statistical analysis of SDGs offers further evidence: the interlinkage between good health and gender equality is ranked ninth in the top 10 synergy pairs.

In conclusion, although there is a strong case for synergies between these three SDGs, the nature of this interlinkage depends on the context, location, and norms present. To correctly specify the impacts, greater analysis of synergies and trade-offs in different country contexts is required.

Insight from Ghana

The Ghanaian case evidences strong synergies among SDGs 3, 5, and 7 but also helps to identify some important dependency factors.

The LEAP IBC model shows strong and positive interlinkage between SDGs 3 and 7. Under the 'business as usual' scenario, in which policy targets and implementation go on as expected, the number of deaths attributed to air pollution from household fuels would continue to rise steadily towards 2030. The elderly are most vulnerable, especially in

rural households where clean energy is used less (Obrumah Crentsil et al., 2020). Some unexpected findings have also been made. Under a scenario that sets stricter targets and policy reforms for cleaner energy, only very few deaths associated with household fuel exposure would be avoided. This synergy is potentially untapped in this case: the health benefits associated with the use of cleaner energy sources are not preventing air-pollution-related deaths (Obrumah Crentsil et al., 2020). However, the number of avoided casualties begins to rise steadily over time suggests a potential timeframe dependency. Given that the elderly (over 70) and adults between 50 and 70 account for the vast majority of household-fuel related deaths, reduced exposure to polluting fuels for a limited time would not counteract the severe health hazards of a lifetime of exposure. If the policies behind the clean energy transition are sustained over time; however, their impact on air-pollution-related deaths begins to emerge as newer generations profit from living in pollutant-free households.

Regarding the SDG 5 and 7 interlinkage, women working at home described physical symptoms associated with exposure to unclean cooking fuels. Unclean sources of energy, including firewood, especially affected their daughters, who (more so in rural areas) become involved in food preparation and other domestic activities involving fuel. There is, therefore, a strong unidirectional (SDG 7 to 5) synergy between both policy dimensions at the individual level. Cleaner energy options—particularly electricity for cooking and lighting—would prevent negative impacts on women and girls' health (particularly in rural Ghana) and also free time from firewood collection to work outside the household (Obrumah Crentsil et al., 2020). However, many interviewees recognised that restrictive gender norms could prevent progress towards SDG 7 being translated into synergies with the economic-autonomy targets in SDGs 5 and 8 (Obrumah Crentsil et al., 2020). When Ghanaian women did not have to fetch firewood, gender mandates could still prevent fulfilment outside the household. As in other cases of interlinkages with SDG 5, norms are an important dependency factor. In conclusion, the evidence from Ghana's case study corroborates previous knowledge of the relationships between SDGs 3, 5, and 7.

Conclusion and policy implications

This final section identifies lessons learned for tackling trade-offs and maximising synergies at the country level among selected SDGs from a policy coherence perspective. This builds upon policy implications identified in each country case study, and adds relevant inputs from the literature review on usual interlinkages (as mentioned in Section 3). The section also assesses considerations common to all SDG interlinkages and policy areas, and their implications for national institutions, information systems, and monitoring and evaluation initiatives. This analysis will incorporate a political economy perspective to identify the potential factors governments and relevant stakeholders should consider when prioritising policies to maximise synergies and tackle trade-offs.

Specific lessons learnt and recommendations for maximising synergies and mitigating trade-offs in the context of SDG interlinkages.

For the purpose of this section, the SDG pairs that the country studies and this chapter focused on are now organised in three overarching groups to avoid repetition. We will present specific recommendations for maximising synergies and minimising trade-offs among SDGs 1, 4, and 8; SDGs 4, 5, and 8; and, SDGs 3, 5, and 7.

SDGs 1 (no poverty), 4 (quality education) and 8 (decent work and economic growth)

There is widespread consensus that ending poverty in all its forms, promoting access to quality education for all, and guaranteeing decent work opportunities are positively correlated. Reduction of both income and multidimensional poverty is positively associated with educational access and attainment. This, in turn, facilitates inclusive labour trajectories and reduces intergenerational poverty transmission. However, in order to achieve synergies between these Goals, conditioning factors that are obstacles to this virtuous cycle must be understood.

Four out of the six SVSS case studies offer insight on how to maximise this synergy in different territories. The previously identified dependency factors offer a good explanation for these divergent results. In Peru and Nigeria, the bidirectional synergy between SDGs 1 and 4 is mainly associated with the fact that a lower socio-economic level is related to being left behind in education. Although Bolivia also meets that condition, evidence of such a synergy is unavailable because there is no visible effect of more schooling on future earnings. Quality of education works as a dependency factor that can either prevent or contribute to the positive impact of the synergy. As for the relation between SDG 8 and 1, the Sri Lanka case shows that the synergy can be encouraged by private sector engagement. Lastly, the relation between SDG 8 and 4 depends again on the country. Where evidence from Peru and Nigeria show a synergy among these Goals, the Bolivian case study presents a limited synergy, conditional upon demand for highly-skilled workers. These findings help identify good practices and recommendations to achieve these three SDGs and seize the synergies among them.

There are two ways in which households access income relevant to understanding poverty reduction. First, it is fundamental to guarantee a basic, nationally-defined level of income for every family. It is of paramount importance to put in place a cash transfer system that protects vulnerable families, particularly those with children and adolescents. This recommendation is in line with the ILO's Recommendation 2020 on Social Protection Floors, that seeks to establish income guarantees for populations, not in the labour market. A study conducted by CIPPEC with an input-output approach analysed the economic impact of increasing the conditional cash transfer system in Argentina, finding that a state investment of 0.6% of GDP to improve it would create more than 133,000 jobs, reduce child poverty by 25%, and increase the country's GDP by 0.7%, hence contributing to economic growth (Díaz Langou, Caro Sachetti, Karczmarczyk, Bentivegna, & Capobianco, 2019). Moreover, the study suggests that 56% of the initial investment would be recovered through tax collection.

Second, it is critical to promote employability development policies to facilitate labour market access. Training, intermediation, and publicly financed internship programmes hold great potential to improve access for lower-skilled workers (Levy Yeyati, Montane, & Sartorio, 2019). However, sociodemographic differences should be considered. Gender critically delineates who profits from these types of policies. Given the sexual division of labour, which places almost exclusive responsibility of unpaid care work and domestic chores on women, it is critical to secure childcare services that allow women to participate in these programmes. As the studies from Nigeria and Sri Lanka showed, the care provision burden is a major obstacle for women's uptake of education and training opportunities (Fernando et al., 2020; Adeniran et al., 2020). Income security must, in turn, also be combined with access to quality public services such as healthcare and education.

Guaranteeing completion of mandatory levels of education is critical to meeting SGD 4. Gender roles play a critical part in explaining school dropout in boys and girls. Opportunity costs related to early labour participation play a huge role in preventing boys from completing their studies, while unpaid care and discrimination are critical obstacles for girls. Policies, including mentorship and economic incentives programmes, should take these facts into account to improve boys' and girls' trajectories. Nigeria's case study is a perfect example of this: restrictive gender social norms operate to the detriment of girls' school attendance, particularly in poorer areas (Adeniran et al., 2020).

Education quality is also important. Educational attainment does not necessarily translate into better learning outcomes. The case studies from Nigeria and Bolivia highlight that improvements in school attendance and completion do not imply improved literacy or numeracy (Adeniran et al., 2020; Andersen et al., 2020). It is therefore essential to adapt curricula to the demands of a changing world of work by accounting for geographical and cultural differences focusing on developing abilities such as critical thinking, resilience, STEM, and arts, to contribute to ongoing learning beyond school. There is a pressing need to close the gaps in the quality of education received by urban and rural populations, as the Peruvian case highlights.

It is also important to engage private sector actors to reduce the gap between school curricula and labour market expectations. This could facilitate access to decent work opportunities. As Sri Lanka's case demonstrates, skills development programmes hold great potential if they are oriented to the cognitive skills demanded by the transformation of the apparel industry and not to routine manual skills (Fernando et al., 2020). Moreover, the private sector can be incentivised to directly improve public services. The UNDP proposes the implementation of social and development impact bonds (SIBs & DIBs), public-private partnerships through which the private sector pay for social services, creating public sector savings. Government or aid agencies repay the private investors upon project success, who will receive both the capital they invested plus interest. This is common practice in developed countries, but quite unusual in developing countries, given the higher risks for investors. One of the first social impact bonds implemented in a developing country was in India and aimed at improving girls' education. The Educate Girls Development Impact Bond financed an Indian NGO called 'Educate Girls', which ran from 2015 to 2018, and

was very successful in achieving its enrolment and learning targets (Kitzmüller, McManus, Buddy Shah, & Sturla, 2018).

In short, reducing poverty and guaranteeing access to quality education are closely linked with promoting decent work opportunities. However, it is fundamental to take into account local specificities and conditioning factors in order to truly unlock such synergies.

SDGs 4 (quality education), 5 (gender equality) and 8 (decent work and economic growth)

The potential positive interlinkages between quality education, gender equality, and decent work are clear. Quality education at all levels can foster positive gender norms and also enhance access to decent work opportunities for women. The relationship also works in the opposite direction: decent work can improve women's agency and their economic autonomy, thus reinforcing gender equality. Yet the case studies highlighted that challenges remain in unleashing these potential synergies.

All the case studies, except Ghana, present evidence of how the synergies among these three SDGs work in a specific context. In most cases, they present themselves in a limited way, mainly because of restrictive gender norms. The link between SDGs 4 and 5 is analysed in India, Peru, and Nigeria. In India, the relationship between these Goals is neutral; the level of education shows no correlation with women's empowerment. This could be an untapped synergy suppressed by India's restrictive gender norms and infrastructure and education quality. The same problem arises in Peru, where even though girls do just as well or better at school than boys, they are likely to be left behind at work due to the gender division of labour. Only in Nigeria is the synergy among these Goals apparently fully acknowledged. The same appears to be true for the relationship between SDG 8 and 5, since gender social norms reduce synergy effects on women in India and Sri Lanka. The dependency factors here are the unpaid care and domestic work, and sexual harassment on public transport and in the workplace. Lastly, in the relationship between SDGs 4 and 8, although there is evidence of a strong synergy, it can be limited through the quality of education and the country's economic specialisation. These findings suggest that it is necessary to tackle those issues which are limiting synergies among SDGs, mainly restrictive gender norms, unpaid care and domestic work, low-quality education, and lack of job possibilities for women.

A series of recommendations are offered. First, it becomes paramount to implement policies that contest restrictive gender norms, prejudices, and stereotypes. As cultural and social transformations take place, it is necessary to take an intergenerational approach, designing gender-awareness initiatives for the general public, workplaces, and schools, as gender roles start being defined at an early age. Social norms on menstruation in some countries, such as India, also reduce women's agency and mobility (Nair et al., 2020). Where relevant, period taboos should be addressed and dispelled with public campaigns, bearing in mind different socio-cultural contexts. The international evidence suggests that sexual education with a gender and human rights perspective secures women's autonomy and rights (Montgomery & Knerr, 2018). Countries could also implement affirmative action policies to promote women's active participation in leadership positions and

non-traditional sectors, creating positive role-models that alter young girls' trajectories (Beaman, Duflo, Pandre, & Topalova, 2012).



Improving educational attainment in Bolivia and Peru did not necessarily translate into better labour participation for women. Care work and restrictive gender norms must be addressed.

Care work is a key barrier to women's education and employment. The case studies show how caregiving and other domestic activities affected women and girls' lives. Indian women stated that motherhood and marriage were key deterrents to joining the labour force (Nair et al., 2020). In Peru, women were less likely to be in employment, education, or training due to care responsibilities (Alcázar et al., 2020). There are several policies which could alleviate care responsibilities for women organised under three categories: those who provide time, services, or money (Pautassi, 2007). In the first category, policies that provide time to care; the main policy intervention is parental leave schemes, which must foster co-responsibility of care between the genders in the household. Secondly, it is also important to provide care services: ensuring women's access to childcare facilities and articulating timetables with working hours to alleviate women's time poverty. The last group of policies provide money to care and are usually represented by transfer programmes which can also have positive effects on the national economy. These initiatives should also consider a complementary scheme for the informal economy, as in some countries a relevant share of women works in precarious conditions.

To catalyse the positive effects of education on labour outcomes, quality and relevant curricula at all levels is critical. Improving educational attainment in Bolivia and Peru did not necessarily translate into better labour participation for women, but improved learning outcomes can benefit labour inclusion (Alcázar et al., 2020; Andersen et al., 2020). This highlights the need to implement teaching and evaluation techniques that ensure that students are gaining knowledge. Appropriate training and education courses must be designed. Curricula and learning materials, especially in skills training and in tertiary education, must mainstream a gender perspective and include contents that are relevant for current and future labour markets. Governments should support research on the future of work while encouraging the private sector to provide training options that meet labour needs.

In addition, it is necessary to ensure employment opportunities for women. The Peruvian case study showed that girls attained equal or better overall results in basic schooling, but were more likely to be left behind in the labour market (Alcázar et al., 2020). It is also essential to address tacit and explicit discrimination against women in the labour market, including encouraging unbiased recruiting and promotion processes, and implementing affirmative policies, both in the private and public sector. As women register higher informality levels, formalisation policies are important.

Safety appeared as a major concern, especially in India (Nair et al., 2020). Women make choices related to their education and labour participation based on whether they feel safe and free from violence risks. Policies need to be implemented to prevent harassment and gender-based violence at the workplace, at educational and training institutions, in the streets and public transport facilities. Formal procedures should allow women to denounce if those situations occur and raise awareness on the need for women to speak up. Complementary initiatives can include

market decentralisation strategies and entrepreneurship programmes that consider teleworking as an option, as these can significantly reduce women's commuting needs and associated risks.

Overall, maximising synergies and eliminating trade-offs requires all these policies to contemplate intersectionalities. The case studies showed that some groups of women are especially disadvantaged. That is why gender equality functions as an enabler for the achievement of other SDGs and the tapping of synergies (Wahlen, 2017). Policy approaches to achieving SDGs 4, 5, and 8 should cater to the needs of these and other vulnerable populations to prevent them from being left behind.

Finally, policy coherence is vital to catalyse the synergies. This implies generating integrated planning, budgeting, and monitoring and evaluation processes at the national and subnational level with a gender perspective. A coherent and integrated approach to gender equality, decent work, and quality education also calls for collaboration with the private sector, civil society, and international organisations.

SDGs 3 (good health and well-being), 5 (gender equality) and 7 (affordable and clean energy)

Unlocking the synergies among SDGs 3, 5, and 7 requires specific policy changes to address limiting dependency factors. Promoting simultaneous progress on affordable and clean energy and health and well-being necessarily requires a gender perspective, as the analysis of the Ghanaian case demonstrated.

Appropriate types of clean energy sources for each context need to be identified. The situation of rural households in Ghana, where primary cooks (mostly women) use biomass energy sources like charcoal or firewood, should be prioritised for energy policy interventions. In these cases, quick action is essential to help households move away from dangerous and polluting solid biomass sources. The switch to clean cooking fuels and efficient stoves cannot wait for electrification and the expansion of the power grid, even though there is consensus that access to electricity is the ultimate goal, conferring many health, education, work, and gender benefits (ENERGIA, World Bank ESMAP & UN Women, 2018). Liquefied petroleum gas (LPG) cookers are a clean and versatile solution for rural areas with difficulties accessing and affording clean energy. Existing policies, such as Ghana's Rural LPG Promotion Program, need to be scaled up and strengthened, and the results and impact evaluated for implementation in other contexts (Asante et al., 2018).

Access barriers at the household level must be considered when promoting clean energy fuels and technologies. Cultural considerations related to traditional fuels, lack of access to appropriate information, limited time to devote to fuel transitions, and restrictive gender norms are all relevant. Restrictive gender norms mean that, even if progress towards clean and efficient fuels for cooking is made (with positive implications for SDGs 3 and 7), this does not heighten women's economic autonomy in line with SDG 5. Initiatives should be tailored to local-level needs and designed in a participatory fashion with users (ENERGIA, World Bank ESMAP & UN Women, 2018).

Secondly, it is paramount to promote and invest in decentralised and sustainable clean energy technologies and infrastructure, with a clear gender perspective. Decentralised, sustainable energy production infrastructure (including solar energy systems at the household, mini-grid, or community level) is an affordable and effective solution for electricity access in a growing number of development contexts worldwide. The role of local women entrepreneurs is critical for the success of these local solutions. As well as the involvement of women in energy supply chains (as entrepreneurs and employees, particularly in non-traditional roles) is a win-win situation (ENERGIA, World Bank ESMAP & UN Women, 2018; ENERGIA, 2019).

Finally, at the broader policy and regulation levels, it is critical to mainstream the gender perspective in governance mechanisms and energy institutions at all levels of government and promote women's participation in them through the design of capacity-building initiatives for women in non-traditional roles (United Nations Industrial Development Organization & UN Women, 2013).

Common lessons learnt and recommendations for maximising synergies and mitigating trade-offs in national implementation of the 2030 Agenda

For implementation efforts to succeed, policy area collaboration must be employed. Given the interdependency of the SDGs, silo approaches would not only be insufficient but also potentially harmful for sustainable development (OECD, 2018). The proposed approach includes identifying and managing synergies and trade-offs in the most efficient way possible, as well as addressing policy conflicts and transboundary or intergenerational effects of domestic and international interventions (Donoghue & Khan, 2019). The lack of knowledge on which actions could trigger negative or positive ripple effects can lead to risks and suboptimal decisions. These must be mitigated in order to keep all countries on track and guarantee the commitment to leave no one behind (Donoghue & Khan, 2019).

Consequently, the 2030 Agenda poses two main challenges for policymakers: on the one hand, it urges them to incorporate an interdisciplinary and integrated approach between different sectors of government; on the other, it challenges the short-term focus and puts long-term sustainability in the spotlight (Donoghue & Khan, 2019). This last issue is particularly difficult for developing countries, where every need is urgent and electoral campaigns may put greater incentives on the most pressing issues.

National strategies for policy coherence

More contextualised research on policy coherence, and how synergies and trade-offs take place in different scenarios, is needed. The six case studies offer a good starting point.

The contextual approach has been gaining prominence in Development Economics since the beginning of the 21st century. It rejects the notion of 'one-size-fits-all' strategies for development (Rodrik, 2008).



Although most countries have publicly advocated in favour of the 2030 Agenda, the commitment can be expressed in different ways.

Consequently, although international evidence is helpful in identifying good practices, each country should define its own strategy according to institutional mechanisms, needs, and priorities. The Voluntary National Reviews that countries present annually to report their progress in the implementation of the 2030 Agenda are useful. According to them, policy coherence is one of the main challenges governments face when putting the SDGs into practice (OECD, 2018). They also offer the possibility to study how different countries use diverse strategies according to their needs (Fukuda-Parr, Bruckner, Hegstad, Kuehner, & Tavares, 2018). This approach responds to the paradigm shift from MDGs to SDGs, which is, in turn, strongly connected to the differences between policy coherence for development and policy coherence for sustainable development. This shift revolves around the understanding that development is a multidimensional problem that, therefore, requires multi-directional approaches (Mackie, Ronceray, & Spierings, 2017).

Policy coherence requires a strong political will, the integration and adaptation of existing institutions to new actors, sectoral political consensus-building, and the implementation of new administrative processes. Five of the eight building blocks identified by the OECD for coherent implementation relate to national activities: (i) political commitment and leadership; (ii) policy integration; (iii) long-term planning horizons; (iv) policy and institutional coordination; and (v) subnational and local involvement.

The OECD (2018) argues that (i) political commitment and leadership refers to the commitment and leadership that national governments need to successfully implement the 2030 Agenda. It should be accompanied by a broad political consensus among different parties, give incentives for different levels of government, and be stated clearly and widely, both inside and outside government (OECD, 2018). Although most countries have publicly advocated in favour of the 2030 Agenda, the commitment can be expressed in different ways. While some countries created new and local strategies, like France's roadmap to implement SDGs, others used pre-existing national plans and adapted them to align with the 2030 Agenda (Mexico with its National Development Plan and the Netherlands with the 'Confidence in the Future' coalition agreement). In the case studies, Ghana, Nigeria, and Peru integrated the 2030 Agenda into existing national development plans. Although this may be helpful if the national strategy is pre-existing and well-functioning, it could also be detrimental for the 2030 Agenda as national plans may take priority.

The second building block, (ii) policy integration, refers to interactions between economic, social, and environmental interventions that maximise synergies and minimise trade-offs to ensure coherence between different policies. The OECD (2018) argues that, in order to guarantee integration, it is necessary to employ specific budget and governance measures. There are multiple ways of fostering policy integration. Chile released new legislation on education, labour, and taxation that explicitly sets out to advance the 2030 Agenda, while Denmark uses integration as a criterion when analysing new legislative proposals. A second group of countries have developed specific working groups dedicated to integrating different policies, such as Switzerland's Federal Council. A third strategy is inclusion of policy

integration incentives in national budgets. For example, Mexico's set of Guidelines for the Programming and Budgeting Process determines dates, actions, and elements on which different federal sectors should agree. Our case studies show that this is a daunting challenge for most developing countries. Although some of them have made great efforts in developing institutional strategies for policy integration, in practice most interventions are fragmented and thus require the strengthening of sectoral institutional mechanisms while simultaneously promoting opportunities for integration.

The third element is establishing (iii) long term-planning horizons that exceed electoral cycles. The 2030 Agenda calls for policies with a long-term impact on sustainable development. There is little compatibility between electoral cycles and the implementation of the SDGs. As a solution, the OECD (2018) illustrates how some countries, such as Belgium and Slovenia, developed national strategies with a 20- or 30-year timeframe. This poses an extra challenge for developing countries where economic instability often hinders long-term planning.

Fourth, it is important to have clear (iv) policy and institutional coordination which, according to the OECD (2018), refers to "assigning responsibility for overall coordination at the appropriate level". This is of crucial importance for national coherence: there should be coordination between entities of a sector (horizontal coordination), and also among different levels of government (vertical coordination). This helps maximise synergies and minimise trade-offs, promotes the sharing of information, and more efficiently allocate resources. Donoghue and Khan (2019) argue that to promote national coordination, it is necessary to include other ministries in the oversight functions, such as finance, planning, foreign development, and environmental offices. They endorse pre-existing mechanisms of horizontal and vertical coordination between different agencies and levels of government, as Chile, Portugal, and the Netherlands did by giving their Ministry of Foreign Affairs the coordinating role. Lastly, they suggest that it would be useful to give the coordinator the capacity to allocate resources.

The last element necessary for enhancing national coordination is (v) subnational and local involvement. The 2030 Agenda and the SDGs call for an integrated approach and are committed to leaving no one behind. Implementation should reach every individual, which is impossible without the cooperation of the government representatives that are closest to the people. In addition, they can identify gaps and needs that are possibly invisible to higher levels of government (OECD, 2018). According to SDSN (Kanuri, Revi, Espey & Kuhle, 2016), 65% of the SDG targets depend on the engagement and participation of local and subnational governments. Moreover, they have a huge budgeting power: in 2015 subnational governments conducted almost 60% of the investment in the OECD area and 40% worldwide (Organisation for Economic Co-operation and Development & United Cities and Local Government, 2016). Approaches differ internationally: in Finland, there are representatives of all cities and regions in the National Commission on Sustainable Development, while in Estonia municipalities have action plans that include the main objectives of sustainable development.

International strategies for policy coherence

SDG interactions are context specific. However, in an increasingly globalised world where interactions between different countries occur on multiple levels, it is important to analyse how these interactions affect the objectives of the 2030 Agenda. Some aspects of the SDGs transcend national frontiers, especially in terms of environmental issues, production, and consumption. In addition, comparing the experiences of different regions and countries is useful in identifying the mechanisms through which synergies and trade-offs take place.

These issues strictly relate to the sixth building block identified by the OECD (2016a): analysing and assessing the potential of different policy effects on well-being in every possible aspect. As the OECD mentions, more study is required of the effects interventions 'here and now', 'elsewhere', and 'later'. Each country should consider how their development strategies impact other countries' and regions' well-being. This approach is strictly related to the shift from policy coherence for development to policy coherence for sustainable development: from a developed-developing and Northern-sided view, to one where every country was acknowledged at the same level, and domestic and international goals should reconcile (Knoll, 2014). To truly understand the impacts of every policy intervention, both through action and omission, some countries included the relationship between domestic and foreign actions in their SDGs implementation process. Germany, in Rule N°12 of its SDG plan (German Sustainable Development Strategy), includes an assessment of how Germany's actions affect other countries either positively or negatively. In addition, both Germany and Belgium have committed to actions promoting public goods and services to create positive externalities to other actors. These issues will be developed further in the global systemic concerns chapter.

In order to achieve international coherence, it is also pressing to guarantee the engagement of different stakeholders, and align actions and incentives between every stakeholder to minimise conflicting priorities. The OECD (2018) argues that this goal is best achieved by establishing dialogue regarding common challenges between stakeholders. If all actors were included in the design and implementation of the SDGs, both at local and international levels, this would undoubtedly create a more representative and legitimate process, enhancing its chances of succeeding (Donoghue & Khan, 2019).

Institutional practices for policy coherence

Policy coherence requires national and international strategies, and also specific institutional practices, to progress the 2030 Agenda and increase actors' capacities to manage SDG interlinkages. It is imperative to build the capacity of agencies focused on SDG-related goals. The last building block identified by OECD (2016a) is useful: monitoring and reporting. Identifying targets and indicators is important to track progress, solve bottlenecks, and profit from low-hanging fruits. Moreover, they can inform policymakers on evidence-oriented practices that enhance interventions, and provide feedback from past interventions, help identify synergies and trade-offs, and collect evidence from transboundary and long-term impacts.

Other useful institutional practices contribute to policy coherence. The OECD's 2018 Report on policy coherence for sustainable development collects lessons from good institutional practices globally. The first is the development of contextual studies regarding the implementation of the 2030 Agenda. The Stockholm Environment Institute and the International Council for Science developed a conceptual framework to identify correlations between SDGs that enable a detailed analysis (OECD, 2018). Its application in Sri Lanka and Mongolia captured some relevant institutional practices for policy coherence that coincide with OECD building blocks, such as strong government participation and the potentialities of designing a strategic process with measurable targets. The six case studies here are also a great step forward in this regard.

The second good practice refers to the instrumentalisation of budgeting processes to monitor investments and offer incentives for the inclusion of the SDGs in ministries' planning efforts (Lobos Alva & Rueff, 2019). Moreover, some countries also encourage their ministries to include a description of how their actions would impact positively or negatively on the 2030 Agenda.

The third strategy refers to drawing specific schemes of implementation, or 'roadmaps', that include different sectors and detail their policy interventions in favour of the 2030 Agenda (OECD, 2018). This strategy has proven useful in identifying interlinkages between the different targets and potential synergies and the actions of different sectors. However, in most cases, these roadmaps did not include all 17 Goals, rather they focused merely on national priorities. This problem should be addressed to promote a truly systemic understanding of the Agenda.

Lastly, the fourth strategy is the instrumentalisation of SDGs through parliamentary or interministerial commissions. Some countries have created specific committees dedicated to analysing the impact of draft legislation on the SDGs, while others have included that function in pre-existing committees.

The six SVSS case studies offer great examples of how institutional practices for policy coherence are implemented in developing countries. In Bolivia, although the 2030 Agenda is not a government priority, there is an inter-institutional committee that leads the monitoring of both the country's long-term development plan and the Agenda which is presided by the Minister of Development Planning. Sri Lanka initially opted for a similar strategy, with the Ministry of Sustainable Development charged with the implementation of the 2030 Agenda. However, in late 2017, Sri Lanka's strategy changed when an act of parliament set in motion the creation of a Sustainable Development Council, charged with developing a Sustainable Development Action Plan and Policy, under the Ministry of Environment. Despite the verbal commitment to the 2030 Agenda, the lack of policy coherence in the institutional framework poses a challenge for SDG implementation, exacerbated by limited indicators and data, and the difficulties with incorporating SDGs into the budgeting process. Bolivia's and Sri Lanka's experiences show that, although specific ministries can act as good protagonists in SDG implementation, it is also necessary to mainstream the 2030 Agenda vertically and horizontally.



The six SVSS case studies offer great examples of how institutional practices for policy coherence are implemented in developing countries.

In Peru, three different institutions coordinate SDG implementation. Despite this, the case study authors argue that the SDGs are mostly missing from public policy discourse and practices. Consequently, Peru still faces multiple obstacles to achieving them. Ghana's case is similar because both have resorted to an institutional arrangement combining eminently statistical and political institutions. In Ghana, the National Development Planning Commission and the Statistical Service are responsible for SDG implementation, while the 2030 Agenda is also integrated into the country's development plan (the Medium-Term National Development Policy Framework 2014-2017/2018-2021).

In India, the institution in charge of integrating the 2030 Agenda into domestic public policies is the National Institution for Transforming India (NITI Aayog). It is also responsible for its implementation and monitoring and was, therefore, in charge of the creation of the SDG India Index, which assesses India's SDG progress in the different states and union territories. It was also in charge of producing a Voluntary National Reviews in 2017, which was unfortunately disqualified after its evaluation techniques were questioned. In Nigeria, the 2030 Agenda is integrated with the national development plan related to economics and human capital (the Economic Recovery and Growth Plan 2017-2020). In this case, the Office of the Senior Special Adviser to the President is responsible for overseeing its implementation. However, the case study shows that Nigeria is not currently on track to achieve the SDGs by 2030, with financial scarcity being one of the main issues the country must address in order to succeed.

This review shows how effective institutional designs must be built on a robust diagnosis of existing coordinating mechanisms, and tailored to each specific context. They must also be accompanied by strong and comprehensive monitoring, evaluation, and reporting capabilities with a strong political commitment behind them, in the context of complementary national and international strategies for promoting coherence in the implementation of the 2030 Agenda.

Closing remarks

Sustainable development is a shared endeavour. It involves and speaks to stakeholders from all sectors, all levels of governance, and all three thematic pillars. The 2030 Agenda for Sustainable Development has made substantial progress in recognising this shared and integrated nature and has mainstreamed this consensus through an internationally agreed set of Goals and Targets for the first time. Therein lies one of the main strengths of the Agenda.

However, this same strength is particularly exacting for implementation efforts at the country level, especially given that (in many cases) countries already have trouble implementing coherent policies among domestic line ministries. Policy coherence strategies at the national and international levels, with a focus on the institutional arrangements that make them happen, are critical to making efficient and effective use of development resources. In this way, it will guarantee everyone's rights and leave no one behind, contribute to economic development, and safeguard environmental sustainability.

Conducting synergies and trade-offs analyses in domestic country contexts is a crucial starting point for diagnosing these potential

clashes between policies and development efforts and working on their mitigation, as well as for exploiting available synergies. This chapter presented a state-of-the-art analysis of what is currently known about synergies and trade-offs at the global level, both in general and in connection with specific groups of SDGs. It then built upon the six SVSS country case studies to conduct a cross-cutting analysis of their findings about the SDGs they had in common. To the authors' knowledge, this is the first attempt to build a framework that integrates SDG synergies-and-trade-offs findings from multiple country studies using diverse methodologies, in one report. More research is needed to analyse synergies and trade-offs in other countries (or at the regional level), with a focus on other SDGs and, crucially, with the use of systemic methodologies and the best available data sources. The SVSS effort is, however, a start that hoped to shed light on the key issues, from a Global South perspective. As we enter the 2020s and the countdown to 2030 begins, it is paramount to delve deeper into the interlinkages among SDGs to boost implementation efforts everywhere and for everyone.

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