

Article

Development of a New Business Model to Measure Organizational and Project-Level SDG Impact—Case Study of a Water Utility Company

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Abstract: Achievement of the United Nations' 2030 Global Goals for Sustainability is of paramount importance. However, for engineers and project managers to take meaningful action, they need the practical tools, processes and leadership to turn grand rhetoric into viable engineering solutions. Linking infrastructure project sustainability performance to sustainable development goals (SDG) targets is problematic. This article builds on the previous development of an innovative infrastructure business model, called the "Infrastructure SDG Impact-Value Chain" (IVC) to link local-level project delivery with global-level SDG impacts. It uses a case study of a water utility company to demonstrate how the IVC business model can integrate the "triple bottom line" to ensure the balanced definition of success across economic, environmental and social thematic areas. The results led to a proposed methodology for business leaders to align stakeholders on a common definition of project success during the design phase. The study includes the selection of longer-term outcomes and strategic SDG impacts, which, it is suggested, are improved definitions of project success. Although the findings that are from a single case study cannot automatically be extended to the entire water industry, the study's methodology has potential to be used to evaluate multiple projects across different sectors. The practical application is significant since it offers the flexibility to be used at both project and portfolio levels, thereby linking tactical delivery to organisational SDG impacts and leading to improved investment decisions with increased likelihood of success in achieving the SDG 2030 targets.

Keywords: sustainable development goals (SDGs); sustainability; sustainable development; project success; infrastructure project; strategy; public management

1. Introduction

The construction industry has a major role in achieving a measurable impact against the sustainable development goals (SDG) 2030 targets. The estimated USD \$94 trillion [1] of investment in infrastructure projects that is required globally by 2040 represents a massive opportunity to stimulate economic prosperity, reduce poverty and raise standards in health, education and gender equality. However, the linking of infrastructure project success to SDG targets is problematic as a recent Institution of Civil Engineers' survey [2,3] demonstrated: while the appetite for SDG reporting at project level is very strong (87%), especially among millennials, only a third of the 325 survey respondents assessed current tools as "fit for purpose". The research study identified four critical success factors (CSF) for measuring projects' SDG impacts:

- CSF #1: strategic success definition. Clear understanding of project success: is it about time, cost and scope (doing the projects right) or is it about outcomes and strategic impacts (doing the right projects) or a balance of both?
- CSF #2: holistic performance measurement tools. The need for tools that could measure traditional outputs of time, cost and scope as well as more opaque successes, such as outcomes, benefits and impacts.
- CSF #3: aligned business priorities. Balancing competing business priorities, which were perceived to weight “profit” too heavily against “people” and “planet”, otherwise known as the “triple bottom line” [4–6].
- CSF #4: strong leadership. The need for leaders who can galvanize and motivate their teams, capturing their “heads and hearts” to drive forward changed behaviours.

The shortcomings of not having the four CSFs in place, which was the main finding from the survey, represents both a theoretical knowledge gap and, for the practitioner, it results in weaker investment decisions since SDG lessons are not being learned from project delivery successes and failures. The problem is complex and multifaceted in nature at both the project and organisational levels. At its core, the most important issue is to understand what defines project success. Too often this has been done by measuring the project management processes of delivering a project to time, cost and scope (and quality), otherwise known as the “iron triangle”. However, for linkage to the SDGs, there needs to be a broadening of the success definition to become more holistic. In short, it needs a new business model. To do so requires a refresh of underpinning theories, specifically in regard to sustainable development.

Before the paper addresses the specific nature of the SDGs and their potential to be used to improve project success definition, on a broader canvas than just “time-cost-scope”, the paper will briefly review the definition of sustainability and also introduce sustainability measurement on infrastructure projects. It will discuss these areas in the following three subsections: the definition of infrastructure (which is the sector that the case study is situated in), the concept of sustainability and sustainable development, and definition and measurement of sustainable infrastructure at organisational and project levels.

1.1. Defining ‘Infrastructure’ (the Relevant Sector for the Case Study)

The Global Commission on the Economy and Climate defined infrastructure as: “structures and facilities that underpin power and other energy systems (including upstream infrastructure, such as the fuel production sector), transport, telecommunications, water and waste management. It includes investments in systems that improve resource efficiency and demand-side management, such as energy and water efficiency measures. Infrastructure includes both traditional types of infrastructure (including energy to public transport, buildings, water supply and sanitation) and, critically, also natural infrastructure (such as forest landscapes, wetlands and watershed protection)” [7,8].

1.2. Sustainability and Sustainable Development

In order to understand the SDGs, it is first necessary to explore the concepts of sustainability and sustainable development that jointly inform much of the nomenclature surrounding SDGs. Research into the definition of sustainability has indicated [9] that there are in excess of 50 separate definitions of sustainability. This highlights that there is a lack of agreement on the practical and theoretical derivation. As an example, Sverdrup and Rosen [10] suggest that sustainability and sustainable development implies the longer term harnessing of the ecosystem to a point at which the resource-capital base, framework or application of the ecosystem is not damaged or adversely changed. Conversely, Costanza and Patten [11] believe that the essence of sustainability is that it provides a litmus test to indicate whether a system survives or perishes. It can thus be shown that sustainability has become mired in value-laden language and is often vague in concept [12], which can cause diffusion of interpretation and confusion in practice [13]. Potentially, this is the reason that Glavic and Lukman [14] suggested

that defining sustainable development in a practical way can be somewhat uncertain since there are several interpretations that can be deployed.

Over the past 50 years, the phraseology and understanding of “sustainable development” [15,16] has become an increasingly central theme of nation states and their citizens. Unlike sustainability, the definition of sustainable development at least has a generally agreed definition from the report of the Brundtland Commission [17]. According to the Commission, it can be defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [17]. Building on this definition, sustainability and sustainable development embody a connectivity with ecological (i.e., planet) and social (i.e., people) as well as economic (i.e., profit) systems. Today, the planetary boundaries provide a global litmus test for how we are doing, using the nine boundaries within which humanity can continue to develop and thrive for generations, with the latest evidence showing that we are failing on most but most critically on three [18].

1.3. Defining and Measuring Sustainable Infrastructure at Organisational and Project Levels

The earlier definition of sustainable infrastructure by Ainger and Fenner [19] was recently developed further by the Inter-American Development Bank (IDB) Group as “infrastructure projects that are planned, designed, constructed, operated, and decommissioned in a manner to ensure economic and financial, social, environmental (including climate resilience), and institutional sustainability over the entire life cycle of the project” [20]. The focus of their investigation was on the detailed analysis of existing sustainability reporting methods across two of the hierarchy levels, i.e., at the project and organisational levels. While there are literally hundreds of sustainability methods used globally, from simple spreadsheet-based approaches to enterprise-wide, cloud-based systems, there are few comparisons of these tools with methods for measuring SDG impacts. Following on from the IDB research, a recent paper by Mansell et al. [21] partially closes this gap by completing a deep and broad analysis of relevant measuring tools. Their work established a golden thread from CEEQUAL (which was compared with other global project measuring tools) with links to the Global Reporting Initiative’s (GRI) global standard for organisational sustainability measurement. Importantly, their research shows both can be linked to SDGs, although both are at a nascent stage of doing so. The research was conducted with the collaboration of both GRI and the Building Research Establishment (BRE), which is UK’s leading centre of building science. BRE, as the owners of CEEQUAL, gave full access to their systems and standards to enable completion of the detailed text and process analysis of both standards in comparison to the SDG targets and indicators. A summary of some of the leading sustainability reporting frameworks from this study [21], at organisational and project levels, is shown in Table 1 with a brief analysis of their explicit or implicit alignment with SDG measurement. It does not purport to provide a full in-depth comparison or discussion of the relative merits, which can be found in the Mansell et al. paper [21].

Table 1. Summary of some of the leading infrastructure sustainability reporting tools/methods at organisational and project levels; for full discussion on these tools and in-depth analysis of CEEQUAL and the Global Reporting Initiative (GRI), see further research by Mansell et al. [21].

Tools and Methods	Relevance for the Case Study
<p>1. Organisational level tools and methods. Global Reporting Initiative [22], UN Global Compact [23], Carbon Disclosure Project, GHG Protocol [24], OECD guidelines and integrated reporting [25].</p>	<p>Based on analysis of the industry leading sustainability reporting frameworks [26,27], GRI was shown to be the most frequently used by leading companies. Indeed, of the world's largest 250 corporations, 92% report on their sustainability performance and 74% of these use GRI's standards to do so, with 23,00 corporate sustainability reports currently in the GRI database [22,28]. For example, it was used by 6671 organisations in 2017 [22] and 75% of Fortune 250 companies across 91 countries.</p> <p>Whilst the UN Global Compact has the "SDG Compass" methodology to support organisations to measure SDG impacts at subnational level, it remains at a high level and does not include any accepted standards for measurement or subnational criteria. The case study expands on the challenge of trying to use the national level targets at organisational and project levels.</p> <p>The GRI has also tried to leverage the widely accepted framework [21] to explicitly measure SDGs but, to date, this has proved problematic since the national level measurement framework is too complex [21], with its 169 targets and 232 indicators (discussed in a later section).</p>
<p>2. Organisational and project level tools and methods. Thirteen sustainability assessment methods were examined, including the following: CEEQUAL (UK & Ireland Projects/International Projects) BREEAM [29], Halstar [30]; SPeAR [31], ASPIRE [32], ISO14001 [33], OHSAS 45001 [33], Jacobs Value [34], LEED [35], ENVISION rating system by ISI and Harvard University [36], IS rating scheme by the Infrastructure Sustainability Council of Australia [37], infrastructure voluntary evaluation sustainability tool (INVEST) [38], SuRe[®] Standard for Sustainable and Resilient Infrastructure [39], sustainable transportation appraisal rating system framework (STARS) [40], IFC Performance Standards on Environmental and Social Sustainability, and World Bank Environmental and Social Framework.</p>	<p>The project-level sustainability frameworks were assessed against their ability to measure SDGs. Most of these were developed before the SDGs were agreed at the UN by the 193 states in 2015 and thus have no formal linkage to SDG measurement. Some, such as CEEQUAL, have started to link to both SDGs and to the GRI to establish a golden thread from project level to organisational level to national-global levels [21]. However, although this research has confirmed there is the potential for the "golden thread" from project to global goals, there is no evidence yet found of projects and organisations having achieved this requirement.</p> <p>Therefore, this confirms the knowledge gap and explains why the case study in this paper is important to commence the research into how leading companies have addressed this matter (the choice of Anglian Water was motivated by their award of the UK's national prize in 2017 as "Sustainability Company of the Year").</p>

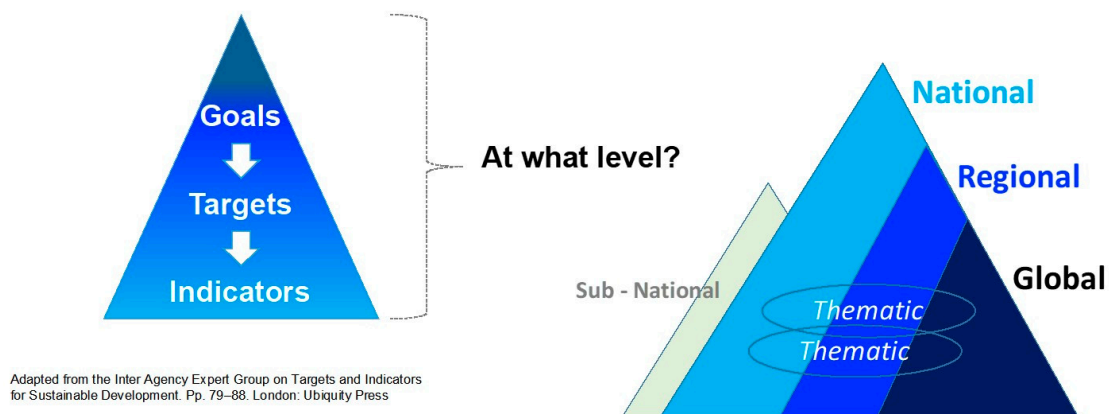
1.4. Sustainable Development Goals

The United Nations' "Transforming Our World" report [41] was adopted by 193 states at the United Nations General Assembly. This has provided a globally agreed sustainable development framework consisting of 17 goals (as shown in Figure 1) and 169 targets to be achieved by 2030. However, progress towards the 2030 targets is perilously slow, especially for the most disadvantaged and marginalised groups [42]. While there have been some significant advances since the Rio Summit in 1992, the "+20" in 2012, and the Kyoto Protocol, such as the transformational technologies for battery-powered cars and renewable energy, even a rise of 1.5 °C now appears to be inevitable [43]. This temperature rise would potentially wipe out almost all of the world's coral with hundreds of millions of people potentially killed from the effects of drought and coastal flooding, while the threat of starvation will likely trigger unprecedented mass migration [43].



Figure 1. The United Nations 17 Sustainable Development Goals [41] (full details can be accessed at <https://sustainabledevelopment.un.org/>). (Usage of graphic agreed by UN).

The delivery targets are understandably ambitious and needed a reporting framework that would drive meaningful and verifiable progress towards the 2030 targets. In 2017, the UN’s Inter-agency Expert Group on Targets and Indicators for Sustainable Development designed a mechanism that linked goals, targets and indicators across the geographic and governance boundaries at national, regional and global levels [44]. Within this framework, shown in Figure 2, the Expert Group designed thematic areas that could also be used at the subnational level but, because the targets and indicators were originally designed to be used at global, regional and national level, they had reduced applicability at organisational or project levels. Simply stated, “one size does not fit all”. This provides a significant challenge because most of the investment needed (USD \$94 trillion) to respond to the global goals [1] is delivered through the business sector, typically through infrastructure projects, which contribute to the systems and services that can positively impact health, wealth and inequalities.



Adapted from the Inter Agency Expert Group on Targets and Indicators for Sustainable Development. Pp. 79–88. London: Ubiquity Press

Figure 2. The sustainable development goals (SDG) Targets and Indicators’ framework designed by the UN IAEG-SDGs [44].

As stated earlier, the SDGs consist of 17 major goals and 169 concrete targets and, because some of the targets are not expressed as concrete numbers, the UN also developed a framework of 232 indicators for monitoring and reviewing the targets. Research into the use of the SDG framework [21,45] on infrastructure projects has identified that the targets (N = 169) and indicators (N = 232) are too numerous and complicated and therefore, unfortunately, they are rarely used by engineering practitioners. The research concluded that a new way was needed to reduce the scientific and statistical complexity of the SDG measurement framework. The starting point for this approach was to evaluate

their usability and applicability at the project level on a sector-by-sector basis. For example, in the infrastructure sector, recent analysis [46] indicates that 81% of the SDG targets are influenced by infrastructure investment projects. However, “influence” is a comparatively weak word without specifying “attribution” (i.e., directly impacting with verifiable evidence) or “contribution” (i.e., linkage presumed but without evidence) and, therefore, despite the positive conclusion from the UNOPS’s analysis [46], further research is needed to identify which of the SDG targets can be used at project level. This provides a fifth CSF:

Additional critical success factor for measuring projects’ SDG impacts (#5): prioritisation of (a limited) number of SDG targets relevant to the infrastructure project.

The problem of identifying suitable SDG measurement is compounded at the indicator level, where a further 232 measurement metrics reside. For example, the UK’s Office for National Statistics (ONS) online portal, responsible for reporting UK’s progress against global SDG indicator measurement, shows that, in April 2019, they only had data for 173 of the 232 indicators, with 69 being without data [47]. The ONS’s challenge of collating reporting evidence for the 232 indicators was further corroborated by recent analysis [45] of the viability of using each of 232 indicators for infrastructure project-level measurement of success. The analysis, based on inductive reasoning using the project success framework proposed by Morris [48] and Cooke-Davies [49] and then analysed against the cost-benefit measurement framework from the HMT Green & Orange Books [50] and the World Bank monitoring, reporting, evaluation and learning methodology [51], highlighted there were only a small number of indicators (N = 28; 12%) relevant to engineering projects. Of these, only 8% (N = 20) have close alignment with the engineering projects and 4% (N = 8) have marginal relevance, as shown in Figure 3. This analysis highlighted a “gap” of not having suitable indicators below the SDG target level that could be used on infrastructure projects.

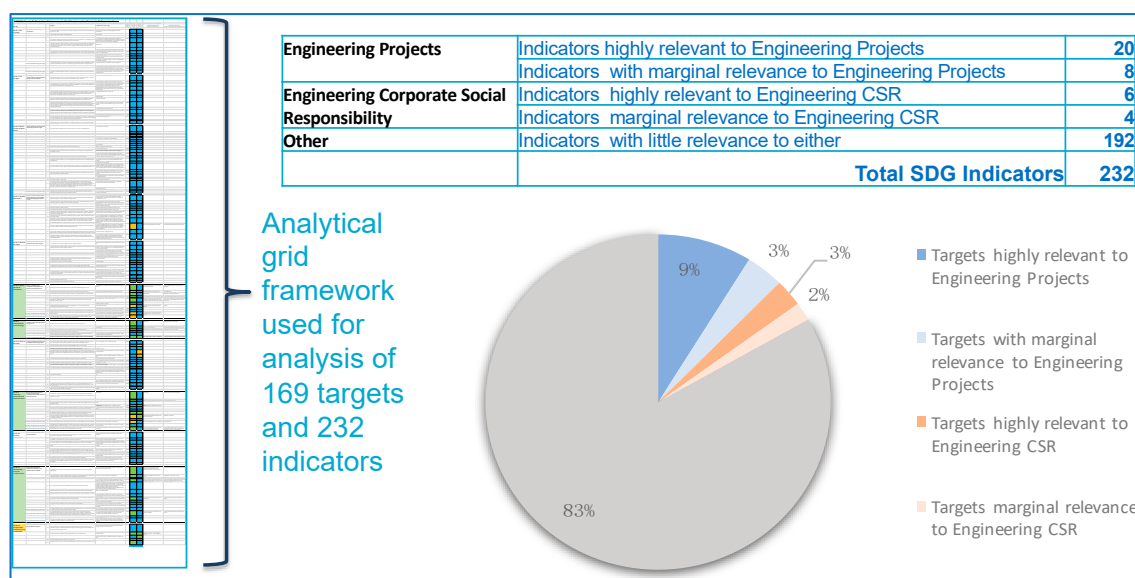


Figure 3. Analysis of the SDG Targets and Indicators’ measurability.

Additional critical success factor for measuring projects’ SDG impacts (#6): selection of (a limited) set of specific infrastructure indicators (not SDG indicators) relevant for infrastructure projects.

1.5. Project Success

Before sharing the new process model, it is important to reflect on the different ways of defining project success, particularly since its relevance is linked to two of the original critical success factors: critical success factor #1 (strategic success definition) and critical success factor #3 (aligned business priorities). While project success is a heavily researched field of study within the field of project

management (see for example the work of [52,53] the quantitative analysis of success criteria, and their alignment to outputs or outcomes, is less evident. For example, Thiry [52] highlights that “too many critical success factors are related to inputs and management processes and not enough on outcomes”. This is further supported by those [48,49] who identify two primary levels of success criteria: project management success (was the project done right?) and, secondly, project success (was the right project done?). To explain the difference, it is helpful to go back to basics—that projects are temporary organisations that have a well-recognised development process, referred to as the project life cycle [48]. To achieve its “ends” (post project), the project management team harnesses the “ways” of tools and techniques, and employs practices, processes and procedures by “means” of a group of skilled individuals. Together the ends, ways and means form a distinct body of knowledge, such as the APM’s and PMI’s body of knowledge. There is, however, a fundamental problem that, as a discipline, project management too often defines success by the best use of these practices instead of what its impact is on producing outcomes of real value [48]. This is important to resolve because of the huge investment across all projects to effect successful change, especially when related to strategic SDG impacts. The two fundamental parts of defining project success are shown in Figure 4. The first question is focused on the delivery phases and is tactical in nature, while the second seeks to define the longer-term outcomes and impacts, which are more strategic in orientation.

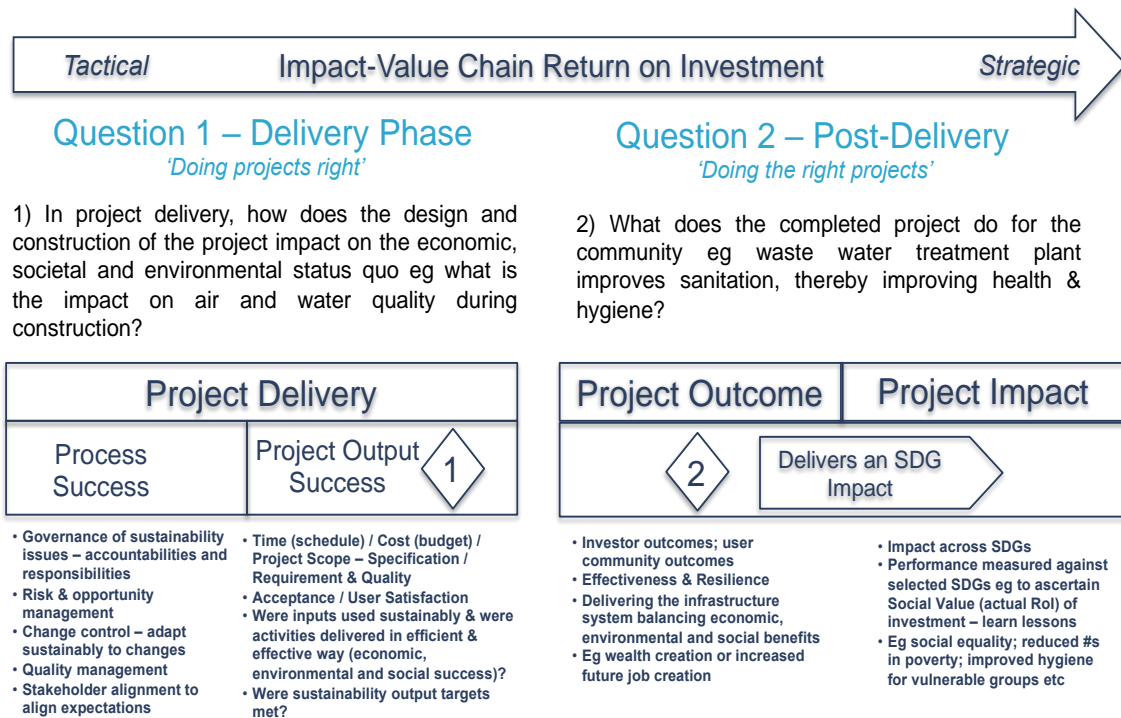


Figure 4. Framework for sustainability and project success reporting. The two core sustainable development questions at project level.

1.6. Infrastructure SDG Impact-Value Chain (IVC) Process Model

Having defined the different ways of classifying project success, a new SDG business model was developed for the infrastructure sector [21]. It provides the “lens”, called the SDG infrastructure impact-value chain (IVC), to analyse whether there is evidence of a “golden thread” between best practice sustainability reporting frameworks at project and organisational levels and those at strategic-level SDG impacts.

The IVC model (see Figure 5) is based on four underpinning theoretical models including: (1) the Theory of Change [54,55], (2) creating shared value [56,57], (3) infrastructure systems approach [58–61] and (4) the triple bottom line [4–6]. The last of these, the TBL, provided the link to SDGs through a

more holistic “systems approach” to address infrastructure sustainability in the SDG context. The IVC provides a new holistic method to potentially improve sustainability on projects and programmes by guiding decision makers in their investment choices through confidence that they link to specific SDG targets.

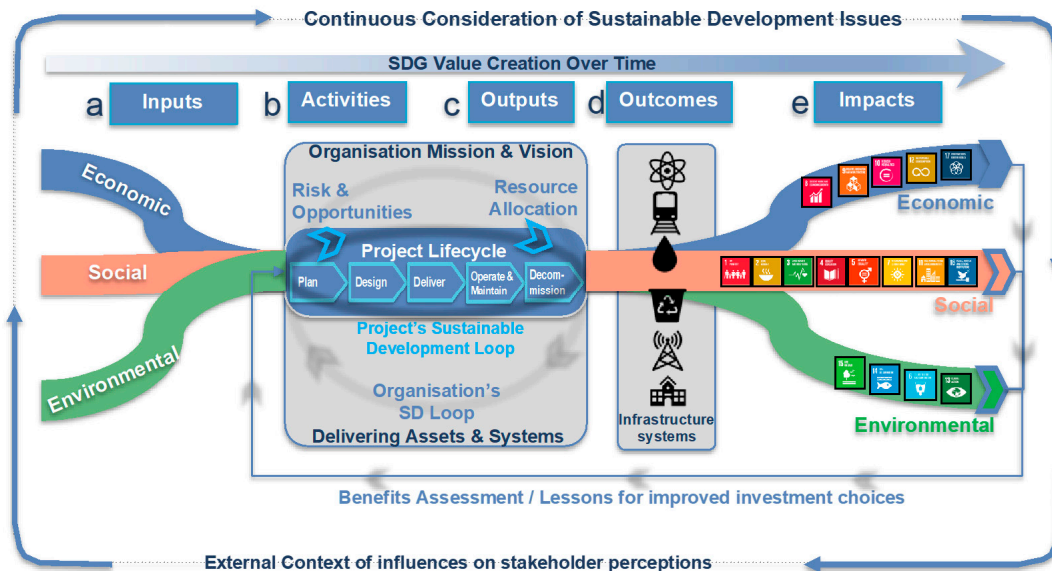


Figure 5. The infrastructure SDG transformation process model—the impact-value chain (IVC). Adapted from ICAS/IIRC’s “The Sustainable Development Goals, integrated thinking and the integrated report” [62].

In practice, the golden thread (the TBL thematic of economic, social and environmental), shown in Figure 5, can be used to map the TBL against the five stages of the IVC as shown in Table 2 (with columns a–e also represented in Figure 5). The examples provided indicate that there are clear “Theory of Change” [54,55] patterns that build through the iterative stages and this can be linked directly to project- and organisational-level understanding of sustainability reporting.

Table 2. IVC table illustrating golden thread mapping of the TBL with the five stages of the IVC.

	(a) Input	(b) Activity	(c) Output	(d) Outcome	(e) Impact
Economy	Finance/investment, insurance, risk contingency allocations, WLC analysis, stable government and noncorrupt financial context.	Job creation; income; wages; source, move and assemble materials; build iteratively through defined activities, such as early earthworks, and local and wider supply chain activity	Project completion to time/cost/scope—bridge, building, road, etc.; income; profit; taxes from in-project business and net present value provides strong RoI against whole life costs.	Economic growth enabled by completed assets as a system, more resilience, wealth creation, ownership, increased future investment and additional job creation.	SDGs 8, 9, 10 and 12.
Social	People, social networks, cultural and technical knowledge, and listening and working with stakeholders.	Collaborative innovation, health and wellbeing, stakeholder engagement, skills and learning, working conditions, production activity and user engagement.	Asset’s social utility, meeting stakeholders’ objectives, individual and group learning, and reinforced community stakeholder groups.	Infrastructure enabled change across health, education, etc., e.g., reduced mortality; gender equality; social equity; justice and post-project knowledge sharing.	SDGs 1, 2, 3, 4, 5, 7 and 11.

Table 2. Cont.

	(a) Input	(b) Activity	(c) Output	(d) Outcome	(e) Impact
Environment	Raw materials, land take, water, light, clean air, energy, planned land use and ecology ecosystem valuation assessment.	GHG emissions; pollution; noise and air quality and works' effects pre and during production, e.g., waste management, nitrogen, carbon dioxide and acidification levels.	Managed effects on completion of asset; replanted trees, etc.; improved local area; no net loss on eco system footprint and short-term environmental targets met.	Restored/improved biodiversity and natural balance, e.g., increased long-term positive effect on environment through improved sustainability.	SDGs 6, 13, 14 and 15.

The data in Table 2 provide the conceptual basis for proposing that there is a golden thread that links tactical success during delivery to the strategic success embodied in the post-project outcomes and SDG strategic impacts.

The next section uses a case study of a UK water utility company, Anglian Water, to demonstrate how the IVC process model can integrate the “triple bottom line” [4–6] to ensure balanced definition of success across economic, environmental and social thematic. The emphasis is switched from “doing projects right” to “doing the right projects”; both are important, but the latter is critical. This is an explicit part of the IVC model, ensuring that short-term project success measures are balanced with post-project longer term outcomes and SDG strategic impact, which many [48,49] have suggested are improved definitions of project success.

2. Methods

The preceding literature review provided insights into the specific research problem of infrastructure project SDG measurement. The review included several themes (infrastructure, sustainability and sustainable infrastructure) as well as reviewing pre-2015 (when the SDGs were agreed at the UN) sustainability measurement methodologies and tools. The learning derived from the literature review illustrated the knowledge gap that exists when using previous sustainability tools, which were not designed for the SDGs, indicating that their use on SDG measurement is uncertain. The case study enables an opportunity to assess an approach by a leading UK water utility company to close the gap. This approach is consistent with what May [63] identified as the fact “that literature should support the researcher in designing and planning the frameworks for the research”. In this way, the literature review enabled the choice of the methodology.

2.1. Using the Realist Evaluation Methodology to Structure the Research

The research study adopts the critical realism perspective of ideological philosophers, such as Bhaskar [64], to inform the choice of the realist evaluation approach, primarily because of its practical utility and its widespread use in social science research into the impacts of programmes [65]. It also provides a way to develop theory-led investigations, which is what this research seeks to do on SDG measurement. The adoption of the realist evaluation’s context-mechanism-outcome (C-M-O) configuration [66,67] is widely used across clinical research and increasingly across social sciences [65]. Indeed, Pawson and Tilley specifically recommend the C-M-O strategy so that “programme theories can be tested for the purposes of refining them” [66] (p. 12). In this regard, the investigation is not about what works but asks instead “what works for whom in what circumstances and in what respects, how?” [66] (p. 2). Therefore, this research approach provides a strong framework for analysing engineers’ perceptions of the context of SDG measurement as well as the potential outcome on redefining investment decisions to achieve broader SDG impacts. For the purposes of this study, the definitions of C-M-O are:

- Context: the conditions in a context of action encompass “material resources and social structures, including the conventions, rules and systems of meaning in terms of which reasons are formulated” [68].

- Mechanism: the underlying entities, processes or structures that operate in particular contexts to generate outcomes of interest [69].
- Outcome: the practical effects produced by causal mechanisms being triggered in a given context [70].

2.2. Using a Case Study to Test the Transformation Process Model

The research team's method was based on using a case study investigation to test and validate the application of SDG measurement on infrastructure projects. The starting point, as shown in Figure 6, was to establish the parameters of the research, briefly outlining the SDGs and the challenge of measuring goals, targets and indicators at project level. This led to the proposed infrastructure SDG transformation process model, called the "Infrastructure SDG Impact-Value Chain" (IVC) [21], that links tactical-level project delivery with global-level strategic SDG impacts. In the process of this analysis, it identifies six areas linked to the "context-mechanism-outcome" (C-M-O) framework that are evolved from the four critical success factors (CSF) in the survey [3], each with its own underpinning question. These CSF questions are then tested against the case study of Anglian Water, a water utilities company that has developed a new business model approach and started the process of embedding SDG reporting at both organisational and project levels. Finally, the results from the case study enable an adaption of traditional business models that have typically focused too much on short-term financial business cases for their investment decisions. It shows that, by using the IVC, the new business model approach could be used at the project design phase to align stakeholders on why/when/how/what SDG targets to measure.

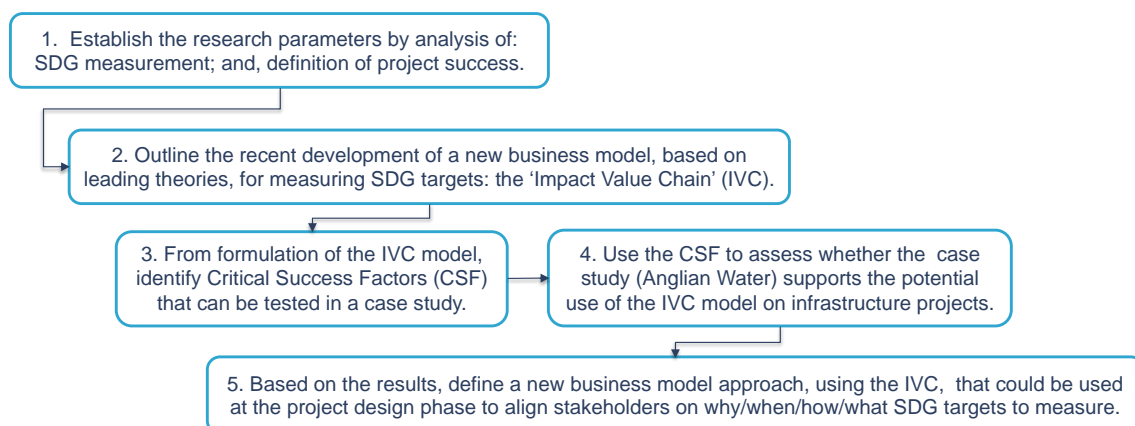


Figure 6. Research methodology employed.

As shown in steps three and four, the case study analytical approach was structured to investigate the four CSFs that were identified from the survey [3] and the two additional CSFs that have been identified from the development of the IVC model [21], as shown in the composite CSF table below (Table 3).

Table 3. Critical success factors (CSF) for embedding SDG target measurement at project level.

Category	C-M-O Critical Success Factors for SDG Measurement	Derivation
CSF enablers (context and outcome)	1 Context—strong leadership. What is the role of leadership to champion the SDG impacts across the TBL?	From engineers' survey [3]. Identified as #4 critical success factor.
	2 Outcome—clarity of IVC project success definition. Do businesses have a clear understanding of the need to separate the definition of success between “in-project” inputs/activities/outputs and “post-project” outcomes and impact?	From engineers' survey [3]. Identified as #1 critical success factor.
CSF for selection and reporting SDGs (mechanism)	3 Mechanism—step 1—prioritising SDG goals aligned to strategic vision. Do businesses have a clearly defined strategy that can guide the prioritisation of SDG goals? The “Ends, Ways, Means” model requires clarity of the “ends” prior to defining project success (in-project and post-project). See column e in Table 2.	From engineers' survey [3]. Identified as #1 and #3 critical success factors.
	4 Mechanism—step 2—select targets relevant to the project. Which SDG goals and which relevant targets are selected at project level to measure impact? Prioritisation of (a limited) number of SDG targets relevant to the infrastructure project.	From SDG analysis [45] and identified in this paper as #5 and #6 critical success factors.
	5 Mechanism—step 3—aligned business priorities/integrate the targets across the TBL. How are the project success criteria balanced across the triple bottom line and what trade-offs are made?	From engineers' survey [3]. Identified as #3 critical success factor.
	6 Mechanism—step 4—reporting and communication. Are the tools available for holistic measurement of success? What is the best way to share data on SDG progress, internally and externally?	From engineers' survey [3]. Identified as #2 critical success factor.

2.3. Central Investigation Using the C-M-O Approach

The central investigation was to test the new IVC business model against current practice using the example of one of the UK's largest water utility companies, Anglian Water. It is amongst the UK's leading sustainability and sustainable development reporting pioneers (with early use of SDG targets) and was the winner of Business in the Community's (BITC) Responsible Business of the Year Award in 2017. This recognised Anglian Water's ambitions, laid out in its “Love Every Drop” (of water) vision, which aimed to create a resilient environment that allowed sustainable growth and the ability to cope with the pressures of climate change.

The data for the case study were accessed by interviewing (1.5 h) a senior board-level member of the Anglian Water executive who, at the time, was the Director for Asset Management (DirAM). A second interview was held with the head of Anglian Water's sustainability management, as a further source of data and information. The DirAM was also the chair of the UK government's Green Construction Board's [71] Infrastructure Working Group and has been a major sponsor and champion of the sustainable development programme across Anglian Water, as well as the infrastructure sector more generally, for the past 10 years. The DirAM provided publicly available documents (i.e., as a form of secondary research) to support the in-depth insights into the company's pioneering work in sustainable development. This research was triangulated by further review and evaluation of the

company’s website and related documents, as well as social media, on the company’s approach to sustainable development in order to verify the data’s validity. Formal agreement for the review and the publication of the findings was agreed by the company in writing by DirAM and Anglian Water’s Director of Brand and Communications.

3. Results and Findings

3.1. Case Study Investigation: Anglian Water—Organisational Focus on Sustainable Development

The Anglian Water approach to sustainability and the SDGs is explained in their Annual Integrated Report [72]. The report includes a description of their impact-value objectives (performance against outcomes) assessment, which correlates with the triple bottom line of the economic, social and environmental thematic. In summary, Anglian Water (AW) describe their TBL priorities as follows (Table 4).

Table 4. Anglian Water’s performance against outcomes.

Anglian Water Outcomes	Objectives
1. Smart business. Innovating by exploring new ways to operate more sustainably and helping customers, business partners and employees to embrace our Love Every Drop strategy.	i. Resilient business. ii. Investing for tomorrow. iii. Fair charges, fair returns. iv. Our people: healthier, happier, safer.
2. Smart communities. Collaborating and engaging with customers, colleagues and business partners, and inspiring them to take positive steps towards achieving our vision for a sustainable future.	i. Positive impact on communities. ii. Safe, clean water. iii. Delighted customers.
3. Smart environment. Transforming behaviours by playing a leading role in reshaping how society values and uses water and reducing our combined impact on the world around us.	i. A smaller footprint. ii. Flourishing environment. iii. Supply meets demand.

These are shown below in the images from the Annual Report [72] (pp. 25, 29) (Figure 7).



Figure 7. Anglian Water alignment of purpose-outcomes and SDGs [72].

The following analysis of the case study is structured according to each of the CSF titles. The data are shown in the form of key quotes from the Director for Asset Management (DirAM) for the company, supported by data gathered from open source documents.

3.2. Context—CSF1: Strong Leadership. What Is the Role of Leadership to Champion the SDG Impacts across the TBL?

Consistent with the survey results [3], Anglian Water place a high priority on leadership to galvanise commitment to their corporate-level sustainability objectives. They achieve this through consistent and strong communications, both graphically, such as through their “Purpose Wheel” (Figure 8), and by the high-profile championing of their sustainable development approach by their board and executive.

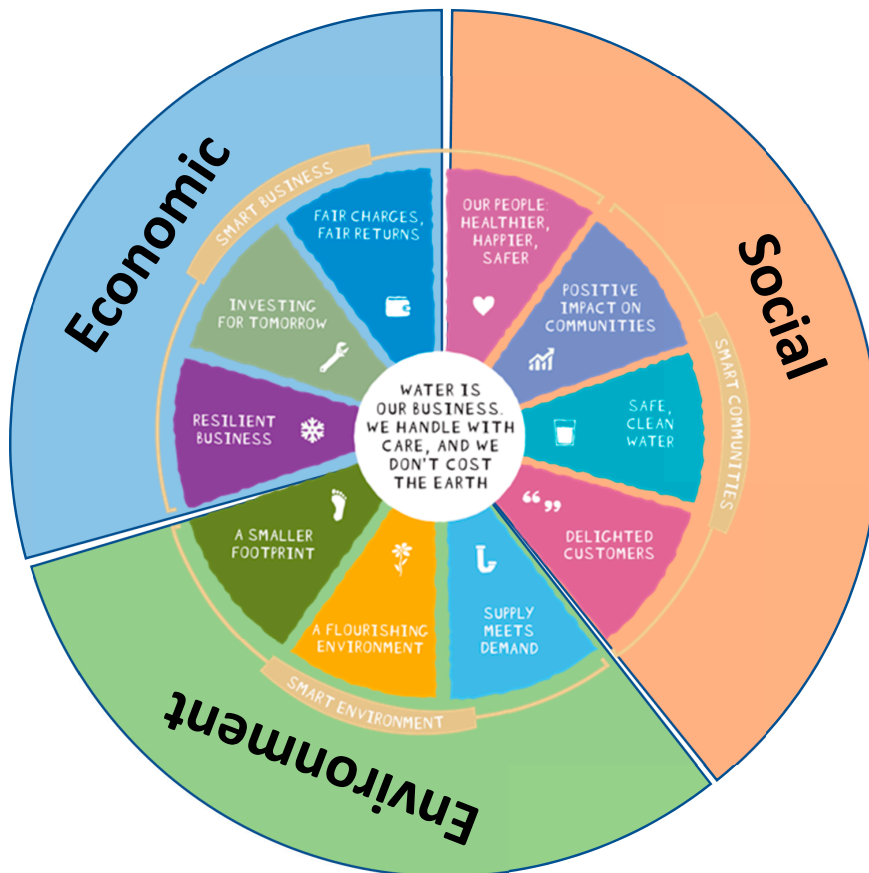


Figure 8. Anglian Water purpose wheel [72] aligned to the triple bottom line.

DirAM, a Director and Executive Board member at Anglian Water, observed (note: in future, all quotes from the interview are labelled as “DirAM” followed by the quotation): “Leadership is the most important critical success factor, both internally and externally, to align and galvanise our employees, our communities and the supply chain. It was about getting us all to be more collaborative in finding novel, innovative ways of delivering sustainable solutions . . . It is about the leaders capturing the hearts and minds of the stakeholders to champion changed behaviours to achieve big, bold strategic outcomes.”

In his view, it played an important part in Anglian Water becoming a sustainable development leader across the sector. DirAM: “there are a number of reasons why we won Business in the Community’s (BITC) Responsible Business of the Year Award in 2017—but a key part was that our CEO brought a very specific challenge back to the business having been inspired by a ‘Seeing is Believing’ visit, organised by BITC, to an area near the Olympic Park in London. The visit looked at how businesses were able to create opportunities and skills for those living in areas of high deprivation and low social mobility. The CEO’s response was: ‘how can we do something on a similar scale, in the region we serve, to make a real difference?’. This led to our hugely successful programme in

Wisbech and helped us develop an approach that we have subsequently used on project work in Nepal alongside Water Aid.”

(Note: The Wisbech project, discussed further in Section 3.8, was a forerunner of the Lahan project in Nepal. Lahan was the first WaterAid project with significant engagement from the utilities’ supply chain and became a beacon to demonstrate how such projects can be driven across Nepal and beyond.) The quote also reinforces Porter’s theory of creating shared value [56,57] because, in this example, there are tangible benefits for the business to be seen to be actively “putting back” into society.

He also notes the moral values that are implicit in the choice of making sustainable development a core business priority for Anglian Water. DirAM: “a vital part of leadership is doing the right thing, just because it is the right thing to do, not because of a box-ticking exercise”. DirAM expands this to state the following: “Our leadership was engaging the supply chain proactively to collaboratively change the way we thought about, and did, our business . . . We wanted the approach to become part of the way we jointly became leaders in delivering our businesses successfully . . . We wanted to establish meaningful change across the supply chain, and we recognised that, to do this, we had to develop long-term relationships; hence, we contracted on a five-, plus five-, plus five-year basis. This built longevity into our thinking and allowed true innovation to develop solutions to the bigger sustainable development issues across the environment—driving efficiency and effectiveness.”

This was not necessarily an approach that was either quick or easy and it needed a tough commitment from the leadership; DirAM: “It is 50% belief and 50% belligerence when you start something like this; that is, holding yourself and others to account. That is what I mean by belligerence. In other words, ‘seeing it through’.”

The core principles of governance [73] of accountability, responsibility and transparency were also noted; DirAM: “a key part of the leadership is the ownership of the sustainable development strategy. It is also about accountability and having the resources to deliver the solution. That is why the ‘Infrastructure Clients’ are the single most important stakeholders in addressing sustainable development. If they ‘own’ and champion the solution, then the supply chain will follow . . . hence, leadership and procurement are the biggest elements of the recent Green Construction Board’s ‘Three Years On Report—Reducing Carbon Reduces Cost’ report” [71].

3.3. Outcomes—CSF 2: Clarity of IVC Project Success Definition. Do Businesses Have a Clear Understanding of the Need to Separate Definitions of Success between “In-Project” Inputs/Activities/Outputs and “Post-Project” Outcomes and Impact?

In the Anglian Water Integrated Report 2018, [72] (p. 8), the CEO says: “We are continuing to plan and to invest in protecting customers and the environment. This year saw the publication of our draft Water Resources Management Plan, which sets out how we propose to balance supply and demand in a fast-growing region over the next 25 years and to protect customers from severe water restrictions in a future drought.” The Annual Report highlights that Anglian Water explicitly assesses both the short-to-medium term economic factors that their investors value as well as the longer term strategic sustainable development impacts that are more aligned to SDG targets.

DirAM explains how Anglian Water used the overall “Love Every Drop” banner campaign to balance long-term and short-term priorities: “In 2015 we refreshed our ‘Love Every Drop’ goals and aligned them with the Outcomes Wheel shown in the Annual Report. So, we thought long and hard about not just the goals that we created but how that fit with a set of longer-term outcomes in our region and what that would look like in terms of implementation. This was our way of meaningfully connecting the strategy with outcomes that our stakeholders recognised.”

It was also noted that Anglian Water uses simple and accessible language (see CSF 6 on communications) to explain their “Purpose Wheel” and its linkage to outcomes-impacts. This aligns with the IVC model and indicates a viable way of thinking “big and long” whilst managing the activities and outputs on a short-term basis to track progress.

3.4. Mechanism—CSF 3: Prioritising SDG Goals Aligned to Strategic Vision. Do Businesses Have a Clearly Defined Strategy that Can Guide the Prioritisation of SDG Goals? The “Ends, Ways, Means” Model Requires Clarity of the “Ends” Prior to Defining Project Success (In-Project and Post-Project)

The Anglian Water approach aligns closely with the IVC model, since it also uses an “Ends, Ways, Means” logic similar to the Theory of Change concept (Figure 5), [54,55]. DirAM: “you must start with the end in mind, even if you have not got a detailed routemap to deliver at every stage of the journey. Part of the mantra is to set big audacious goals and then adopt an attitude of ‘I have started so I will finish’ and, by the way, you never actually finish, because the end goal is moving; it is like you achieve one peak but realise it is a false horizon, and so you continue your climb to the next summit.”

As well as the ten prioritised goals, Anglian Water have also prioritised 35 targets that are most easily measured at project level, which are reproduced below (Figure 9).

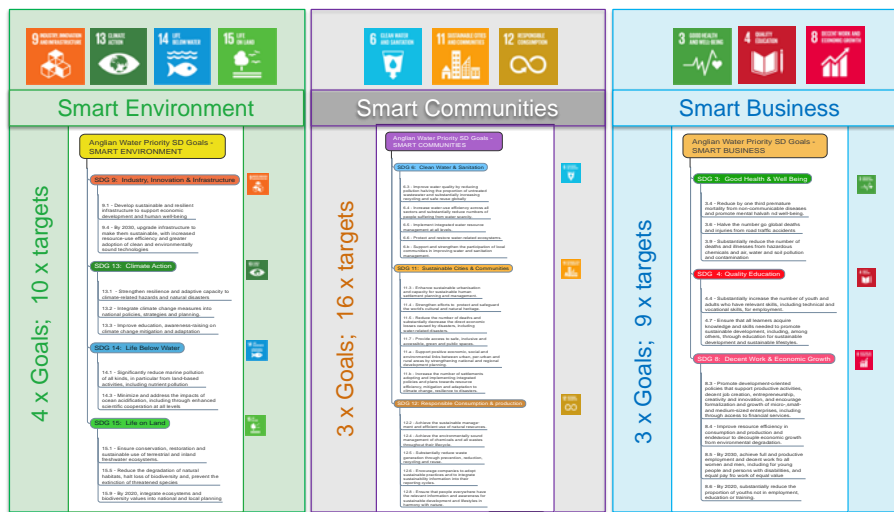


Figure 9. Anglian Water has three business priorities that are balanced across the triple bottom line (for illustration only). The specific SDG targets (N = 35) in this figure are reproduced in readable format in Table 5.

The value of having clarity of the strategic ends is noted, albeit with a caution that the identification of targets for tracking performance must not become a “box-ticking” exercise that distorts clarity of outcomes; DirAM: “if you actually begin with the end in mind of the outcome you are seeking and how you wire your DNA to achieve that, you are far more likely to achieve those outcomes, and in so doing the boxes get ticked. But if you predicate your thinking with thoughts about just filling the boxes, you have constrained yourself.”

Therefore, to overcome the box-ticking mentality, DirAM explained their approach: “Anglian Water thought long and hard about its position in the region and how we contributed strategically as a major player in the region and we created the concept of “Love Every Drop” and, in essence, our own SDGs to align our strategy with local outcomes . . . We used the “Love Every Drop” goals to identify ambitious aspirations, which meant that our business had to think longer term.”

3.5. Mechanism—CSF 4: Select Targets Relevant to the Project. Which SDG Goals and Which Relevant Targets Are Selected at Project Level to Measure Impact? Prioritisation of (a Limited) Number of SDG Targets Relevant to the Infrastructure Project

The chart in Figure 10 illustrates the 35 targets selected by Anglian Water, which at first sight is impressive, but the interview identified that it is challenging to move beyond the rhetoric of great sounding qualitative statements. Therefore, it is important to agree and publish hard quantitative targets that the success of the organisation can be assessed against; DirAM: “. . . so we nailed our colours to the mast and started reporting against those. One of them was to take 50% of the carbon out

of the assets we build by 2015. It was the one that had a specific date on and a specific quantity, and I deliberately did that because I believed it and I was belligerent enough to drive it. . . . That is the one that, perhaps, out of all sustainability targets and goals, Anglian Water had the greatest recognition from and probably reflects the greatest change programme that has gone on across the whole of the supply chain.”

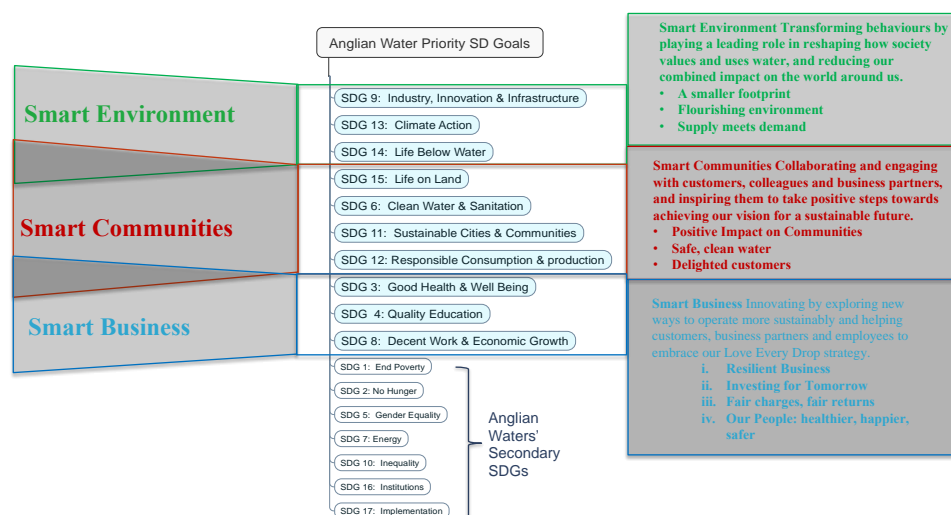


Figure 10. Anglian Water has three business priorities that are balanced across the triple bottom line.

3.6. Mechanism—CSF 5: Aligned Business Priorities/Integrate the Targets across the TBL. How Are the Project Success Criteria Balanced across the Triple Bottom Line—What Trade-Offs Are Made?

A representation of the linkage of the Anglian Water three TBL thematic outcomes [4–6], aligned to their ten prioritised SDG goals, is shown below.

In the Anglian Water integrated report of 2018 [72] (p. 9), the CEO, Peter Simpson, says: “Since becoming Responsible Business of the Year, we have been working hard to show others how sustainability makes good business sense”. This quote emphasizes the Anglian Water experience that aligns with the creating shared value [56,57,74]. It implies that the TBL [75] can be balanced—a strategy that focuses on the environment and society, which can equally achieve economic success. When in harmony, real growth is delivered to the benefit of all, as shared by DirAM: “For example, our approach to ‘product lifecycle management’ was learned from the aeronautical and automotive industry from 2004–2005 and this meant that we looked at the whole life costs, which not only ensured we were more outcomes focused, but, by the way, improved our productivity by 3% each year, year on year, highlighting that good sustainable development also made good business sense”.

3.7. Mechanism—CSF 6: Reporting and Communication. What Is the Best Way to Share Data on SDG Progress, Internally and Externally?

It has already been noted that Anglian Water had a policy of thinking long-term, explaining their sustainable development approach in accessible language and also the need to uphold strong governance principles of accountability and transparency [74]. This has led to a strong ethic of being held accountable for delivering meaningful change, including publishing their strategic objectives in quantifiable terms (such as the carbon figures noted in the paragraph above) as well as, equally importantly, the results; DirAM: “learning from the likes of Marks and Spencer’s Plan A, we realised you had better publish your sustainability plans and outcome targets so that you are kept honest in the process—there is very little point nailing your colours to the mast and then not living to the high expectations . . . so the message was that we must commit to do the things that matter to us. That is what gets people excited, because it really matters. We are tough on ourselves on reporting what happens, and this allows us to measure what impact we are having so that we can measure the benefit.”

The theme of honesty and allowing stakeholders to hold the executive and board to account is a powerful lesson that also relates to measuring SDG impacts at project level; DirAM: “But the point about turning your ambitious goals into reality, to avoid superficial statements, is that it is all recorded—it is published annually, which is an important part of defining where you are going. Driving towards it with no ‘U’ turns when some tough decisions have to be made. It is obvious that you have to make loads of tough decisions rather than duck them, and then recording your progress in an open and visible way helps keep you honest in that process.”

A cautionary note about communication was that the messaging should be kept simple and accessible; DirAM: “We found that our campaign and collaborative working with partners had created a different conversation with different language. Ultimately, accessible language on meaningful outcomes is what people can buy into and this is what creates the momentum of changed behaviours ... Through engagement and innovative solutions addressing the big problems, Wisbech is an example of working with the community to achieve meaningful long-term changes.”

3.8. Overview Analysis of Anglian Water’s Projects Set against the IVC Framework

The reference to Anglian Water’s Wisbech project in the previous quote provides a holistic test against the six critical success factors and a useful way to cap the case study analysis. Launched in January 2013 as part of Anglian Water’s “Wisbech 2020” vision [75], the Wisbech project was chosen as part of this case study because data on its delivery are open source on the internet. It was delivered by Anglian Water with its partners as part of their commitment to make a long-term impact on the market town of Wisbech for more than the five years that the initial project covered. Located just 40 miles from Cambridge, UK, Wisbech faced many socio-economic challenges but also had potential for significant growth and development [75]. The vision proposed a new garden town with 10,000 homes, bringing transport, education and health benefits to the town and surrounding region. By using this project as an example, Anglian Water wanted to assess whether a broad programme of social, economic and environmental change to improve the local communities’ lives could be linked to the SDGs using the IVC.

The table below mirrors the formatting of the IVC table (Table 2) and has been updated with data from the Wisbech project [75]. The simple steps to achieve the Wisbech-adapted IVC included: reading and analysis of the publicly available documentation of the Wisbech project, identification of key data across the IVC framework, cross-checking across authors to assess the credibility of interpretation and sharing the final table with Anglian Water to ensure the consistency and accuracy of project data. This provides an assessment as to whether projects could have both the “in-project” successes measured as well as the “post-project” outcomes and SDG impacts as defined in the Theory of Change [54,55]. It is evident that it is easier to define quantifiable success criteria for the inputs-activity-outputs during the in-project phase because they are tangible and delivered as core delivery performance measures, such as time, cost and scope/quality. On the other hand, the outcome and impacts are typically delivered after the completion of the project and are more diffuse. Thus, the example from the Wisbech project shown below is not conclusive but gives indications that the IVC provides a useful framework to engage stakeholders on what project success looks like during and post-delivery. It should be noted that the Wisbech project is an outreach community programme inspired by HRH The Prince of Wales’ “Seeing is Believing” initiative, which seeks to find ways to support marginalised communities. The SDGs therefore offer a framework to address the more diffuse outcomes and impacts that might not typically have been defined and measured using traditional project measurement approaches.

3.9. Policy Implications Derived from Analysis of Anglian Water’s Use of the IVC Framework.

There are a number of policy implications, shown in Table 5, that emanate from the analysis of the Anglian Water case study. These are listed at both the organisational and project levels and involve multiple stakeholders, including clients, investors, suppliers and communities, who all benefit from the use of the derived models proposed in this paper.

Table 5. Applying Anglian Water’s Wisbech project initiative to the IVC grid with mapping of the TBL with the five stages of the IVC.

	Input	Activity	Output	Outcome	Impact
Economy	Secoded a senior operational manager to Wisbech in 2013 and agreed support from other supply chain partners to become involved in the project. This allowed the cost, expertise and effort to be shared across a broad range of partners.	Worked jointly with the local Fenland District Council to develop a longer term strategy beyond their existing 2020 Vision, which was thought to be too short-term to encompass the “big, hairy, audacious” strategic goals that could achieve transformational change, building a business case for the “Garden Town” that would attract investment and large transport infrastructure improvements.	Championing apprenticeships and a training scheme with 20 trained and employed year on year. Turning the community centre from a £30, 00 per annum loss-making entity to a vital community hub, fuelling future economic success. Confirming the lease and implementing the creation of the “Jobs Fair” and the “Jobs Café” and the campaigning body for getting rail back—now in the County Transport Plan.	Bills, affordability and profits to stimulate and sustain the local economy, especially those on lower incomes (bills have only increased by 10% since 1990). Viability of the future rail and integrated transport system attracting more regional investment and raising local people’s aspirations. Market town proposal, with planning for over 10, 00 new homes, providing “scale of growth” confidence.	SDGs 8, 9, 10 and 12.
Social	Started by listening in order to understand the local issues from the local community’s perspective. Brought together senior leaders from “The @One Alliance”, creating a collaborative multistakeholder approach. Focused on building long-term sustainable relationships with the local community.	Collaborative innovation with the local community in open and honest talks, health and wellbeing, stakeholder engagement, skills and learning, working conditions, production activity, user engagement, keeping the local community at the heart of the project plans and delivery, working with the College of West Anglia to train more mechanical and electrical engineers, designing and running new courses and providing IT support from partners to raise the aspirations of unemployed.	Providing a community centre (refurbishment of the Queen Mary Centre) that is the hub of employment opportunities; active STEM subjects engagement with schools; specifically focusing efforts on helping those not in employment, education or training; untapped, unused human resource; organised the BITC “Big Connect” event, aligning business connectors from across UK; and a second phase for the Queen Mary community Centre to include theatres and a music teaching centre.	Achieving “Business in the Community” outcomes such as regeneration; building on the “Seeing is Believing” community initiatives; understanding the value of long-term thinking; providing safe, clean and reliable water; improving the town’s/region’s standing as the sixth worst ranked town on the social mobility index in the UK and addressing the life expectancy that was three years less than in Cambridge.	SDGs 1, 2, 3, 4, 5, 7 and 11.
Environment	Raw materials, land take, water, light, clean air, energy, planned land use and ecology ecosystem valuation assessment.	Management plans for the flood risk, building resilience into engineering designs and using innovative modelling techniques developed by the Dutch government.	A commitment to protecting and restoring our wealth of wetland habitats and making a difference to rare and common species, be they in wet grasslands, open water, fens or mires.	Building resilience to cope with future challenges. Protecting the environment we live in. Through the Flourishing Environment Fund, helping environmental organisations deliver real benefits for nature.	SDGs 6, 13, 14 and 15.

Organisational policy implications:

- There is evidence that businesses identify value in the adoption of global SDG performance measurement at the local level. This is consistent with the theory of creating shared value [56,57,73] that identified a greater benefit to businesses than CSR being an add-on. The complexity of the global-national measurement framework makes measurement at subnational level challenging. The need for simplicity is important and examples of success, such as this case study, are helpful in galvanizing others to follow and share lessons learned. This is important for users of the models because the case study makes clear that some organisations are employing the language of SDG measurement but without a formalised methodology to do so. This makes it difficult to replicate because the ad-hoc nature of the measuring methodology used by Anglian water does not easily support cross-sector comparisons using a common framework that would have facilitated further knowledge sharing and delivery improvements.
- The SDG measurement approach can align with existing approaches to sustainability measurement. This offers efficiency of processes and systems if they can be linked. The case study gives confidence that existing reporting approaches to sustainability, such as CEEQUAL, are complementary to the proposed SDG measuring methodology. This highlights that the IVC can be adapted, such as by using language that “makes sense” to the local stakeholders and does not alienate existing project delivery teams who would not want an additional large reporting system mandated. The opportunity to align existing sustainability reporting metrics to SDG targets offers a valuable line of future research.
- There is evidence that businesses that already have a strong track record in sustainability measurement can readily adapt to the language and approach of using SDGs. Anglian Water had recently been awarded the UK’s Sustainability Company of the Year, which meant that the case study interviews and review of their documentation were conducted with a highly mature organisation that had a well-developed plan for delivering clear impacts. They also had a strong leadership team to champion the trialling of the SDG measurement approach. The bigger question remains how successful the lower performing companies might be at addressing the complexities of SDG measurement. Again, this is an area for further study since that is where the majority of benefit might come from, by developing an approach that is easily replicated across the sector.
- The contextual issues, such as leadership, are a critical success factor. Strong leadership that is meaningfully engaged in championing the use of SDG measurement will be more likely to deliver tangible evidence of SDG impacts. This becomes a critical point as the strategic nature of organisational change has to be driven from the top [76]. There was recognition by the Anglian Water executive that, in reality, this meant that leaders at all levels were needed as champions, which, for SDG measurement, needed to be aligned with success stories that would make sense to the target audience written in their language and justifying “why” followed by explaining clearly “how”.

Project level policy implications:

- The effective use of SDG measurement at project level needs buy-in from both internal and external stakeholders. The engagement of suppliers is critical to ensure common focus on identifying what SDG success looks like and to work collaboratively to seek innovative solutions to deliver meaningful SDG delivery success.
- There are a number of mechanistic issues that become critical to SDG measurement success. These include: prioritising relevant targets and indicators (do not select too many); seeking to understand how the few selected goals and targets can have a simple indicator framework that allows the capture of reliable evidence; and ensuring that reporting and communicating is open, honest and timely, sharing both good news and bad news. There is also a need continually to learn and evolve and so build a better framework that achieves a more balanced investment decision across the TBL of people, profit and planet [4–6,73].

4. Conclusions

The central investigation in the case study of Anglian Water was to test and validate whether the new infrastructure business model, called the “Infrastructure SDG Impact-Value Chain” (IVC), could link local-level project and organisational delivery with global-level strategic SDG impacts. The study used the “golden thread” of the TBL thematic areas (namely economic, social and environmental) to interrogate whether one of the UK’s leading water utility companies, Anglian Water, was already delivering strategic sustainable development solutions that could be mapped to SDG targets. Although the research was conducted in the UK, the findings have possible broader applicability to other countries since most of the issues are neither culturally nor geographically specific. This is a valuable area of future research that could potentially engage with a number of construction firms with global footprints to compare the differences and similarities of measuring SDGs across and within different regional areas. For example, UNOPS [46] research indicates that there are many contextual global issues that affect the use and measurement of SDGs but, while noting the differences, they suggest that all issues should have a consistent framework to enable cross-cutting comparisons.

The results of the case study investigation have indicated that there is a verifiable link across the IVC of activities-inputs-outputs during the “in-project” phase, connecting to the “post-project” outcomes and SDG impacts. A number of Anglian Water’s projects were mapped to this schematic (although, for brevity, only one, Wisbech, is reproduced in this article) and this gave confidence that the approach could have wider applicability. Therefore, the results led to a proposed methodology for project leaders to use as a way of strategically aligning stakeholders on a common definition of success, linking tactical “in-project” success of outputs with the more strategic outcomes and SDG impacts “post-project”. The methodology would ideally be used during the design phase of the project. The emphasis is switched from “doing projects right” to “doing the right projects”. It includes the selection of longer-term outcomes and strategic SDG impacts, which, it is suggested, offer improved definitions of project success.

The five proposed steps, shown in Figure 11, emanated from the six critical success factors that were used as a framework for the case study. These are proposed as a way to initiate the “right project” in the “right way” and with increased clarity of “Ends, Ways and Means”.

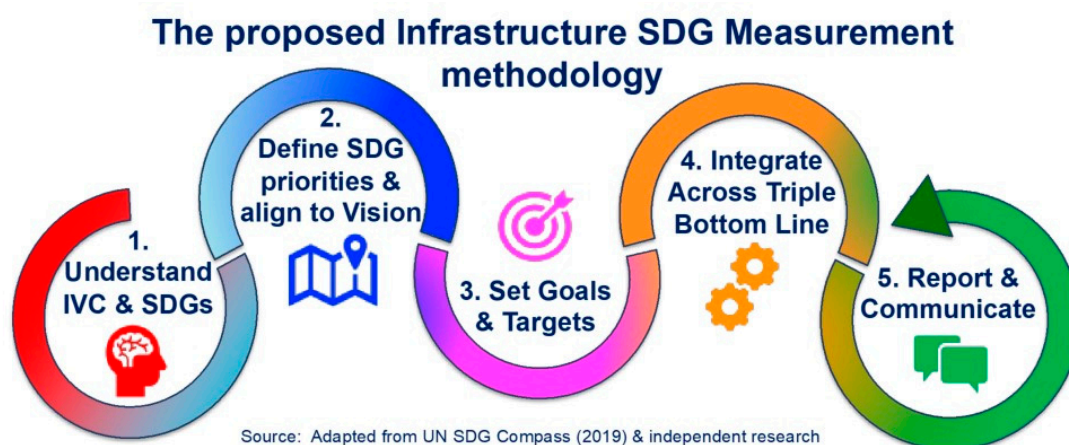


Figure 11. The proposed infrastructure SDG measurement methodology derived from the six critical success factors and the application of the impact-value chain (IVC) model to the Anglian Water case study.

Future Work

The research study has focused on a single case study in the UK and cannot automatically be extended to the entire water industry, either nationally or internationally. The methodology adopted, however, has potential to be used to evaluate multiple projects across different industry sectors. In this

way, the results can thus provide insights for further research across the water industry and also potentially across other infrastructure sectors and geographical regions.

The next stage of the research is to develop the infrastructure SDG measurement methodology proposed in Figure 11 into a fully defined methodology that is adaptable to the scale of the project and also its position in the project-programme-portfolio hierarchy. Thus, the model could be tested in industrial scenarios on identified projects. The case studies will be broadened to include both developing and developed countries and will focus on a single asset type across the national economic infrastructure categories of energy, waste, water, transport and ICT. The practical application is significant since, with improved linkage of tactical delivery to strategic SDG impacts, improved investment decisions will be made, and systemic level lessons can be applied to increase the likelihood of success in achieving the SDG 2030 targets.

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