# WHY PROJECT MANAGEMENT IS CRITICAL TO ACHIEVING THE SDGs AND HOW THIS CAN BE ACHIEVED

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## Outline/Abstract

This paper seeks to understand how projects can make an increased impact on the United Nations (UN) 2030 Sustainable Development Goals (SDSs). The paper proposes Creating Shared Value as a synergistic method of achieving economic business success on projects, whilst also delivering wider benefits to society and the environment. The use of this 'Triple Bottom Line' can link SDGs to normative project success criteria. The paper provides a comparative study of literature with synthesis of findings and development of a conceptual model to guide future research.

**Keywords**:

UN SDG; Sustainable Development; CSV; Sustainability; Project Success; Measurement; Outcomes; Grand Challenges

## Introduction

The planet is in crisis and we need radical change. This paper shares research data on why Project Managers are critical partners in delivering this change, but first, must find the tools, methods and leadership to link project-level benefit realisation with national, regional and global targets. The urgency of finding project solutions to these challenges is highlighted by the United Nations (UN) Intergovernmental Panel on Climate Change, that released their latest and most damning report on 8th October 2018 (IPCC, 2018). The report drew on 6,000 research papers. The evidence of global warming exceeding 2$^{o}$C above pre-industrial levels by the end of the century is overwhelming and indicates 'impending catastrophe' – climate change is an existential threat to the human race. Whilst there have been some significant advances since the Rio Summit (1992 and +20 in 2012) and the Kyoto Protocol (2005), such as the transformational technologies for battery-powered cars and renewable energy, even a rise of 1.5$^{o}$C now appears to be inevitable. This temperature rise would potentially wipe out almost all of the world's coral with hundreds of millions killed from the effects of drought (Sachs, 2016) and coastal flooding, whilst the threat of starvation will likely trigger unprecedented mass migration.

More recently the international community has responded to the sustainable development challenge with the Sustainable Development Goals (SDGs) for 2030 in their report, 'Transforming Our World: The 2030 agenda for sustainable development', adopted by the United Nations General Assembly in 2015. Three years into a global commitment to deliver meaningful SDG action, we are falling behind on our global and local ambitions (Office of National Statistics, 2018). This is relevant for project managers because much of tomorrow's resilience and development will be delivered by the project management profession, across all sectors, but especially infrastructure. For example, the IPCC's October 2018 Report identifies that "directing finance towards investment in infrastructure for mitigation and adaptation" is

key to meeting SDG targets. The estimated USD $97.5 trillion (Global Infrastructure Hub, 2017) 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; whilst the appetite for action is very strong, especially by millennials (Mansell, 2018), there do not appear to be the tools, methods, leadership or business-society-environment framework to carry out meaningful measurement of SDG success at project level. This represents a knowledge gap that results in weaker investment decisions since SDG lessons are not being learned from project delivery success and failures. Therefore, a key need is to make a problem that is identified as a 'Grand Challenge', relevant to the project management field at 'grass-root' level. Indeed, what is the golden thread between the ground-level project delivery and the strategic level of the SDGs? To develop an improved understanding in these areas, an analytical framework was developed to structure the research and from the results, develop a model for further research.

## Literature Review

The failure of not meeting the 2030 targets of the United Nations Sustainable Development Goals (UN SDG) is amongst the most significant global Grand Challenges threatening our survival today and the project management community has a key role, perhaps the most important role after governments, in making a positive impact on the 2030 targets. But what are Grand Challenges? It is a term used predominantly by the academic community to qualify and structure responses to so called 'wicked problems' (Head and Alford, 2015) of immense magnitude and impact. In 1989 the United States White House Office of Science and Technology Policy (OSTP) started using the term Grand Challenges in public-facing documents and has since developed a formalised definition as "*ambitious but achievable goals*

*that harness science, technology, and innovation to solve important national or global problems*" (OSTP, 2013).

The US government's definition implies that practical action-based solutions are needed to impact the national and global policy context. Therefore, Grand Challenges' capture ideas that are equally relevant to academics as well as practitioners. They are also, by definition, both ambitious ("capture the peoples' imagination") and also achievable ("solve … problems"). Additionally, the definition identifies the need for measurement and impact to demonstrate meaningful progress. The White House definition also suggests that the Grand Challenge problems are defined in a way that enables multi-disciplinary communities to jointly collaborate to find new solutions. In this regard, the definition has evolved since Mertz's (2005) focus on the engineering communities, to a broader group of stakeholders that includes policy shapers, funders, and delivery-to-operations project teams (Omenn, 2006). Consequently, project management professionals will take a leading role in this, especially in providing tangible action that can be implemented by practitioners to affect improved performance against the SDG targets.

More recent research into Grand Challenges (Sakhrani et al., 2017) has identified four characteristics that are helpful in this paper's analysis: (a) articulated by stakeholders, (b) specific, (c) ambitious yet feasible, (d) framed in a manner that suggests the use of specific methods or disciplines, and (e) have the potential for broad impact. These characteristics provide a useful reference point for examining how the project management community can respond to the Grand Challenges of the UN's Sustainable Development Goals. But firstly, before examining how projects can measure SDG success, we need to understand why this is important and how sustainable development has evolved into a 'three-legged stool' that balances economic, social and environmental priorities; what some call: People, Profit and Planet.

Sustainable development is "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" (Brundtland, 1987). Over the past 50 years, sustainable development (Sachs, 2016) has become an increasingly central theme of nation states and their citizens. Today, the Planetary Boundaries (Rockström, 2009) provide a global litmus test for how we are doing. The concept of nine planetary boundaries within which humanity can continue to develop and thrive for generations to come and was developed in 2009 by environmental scientists from the Stockholm Resilience Centre led by Johan Rockström and Will Steffen from the Australian National University. In 2011, the then UN Secretary-General Ban Ki-moon urged global society to "*Help us defend the science that shows we are destabilising our climate and stretching planetary boundaries to a perilous degree*". The most significant global response to the Planetary Boundary challenge was in 2015, when all governments ratified the UN's seventeen Sustainable Development Goals (SDGs - United Nations, 2015), shown in Figure 1 below, to be achieved by 2030 (with 169 targets and 244 indicators agreed in 2017). This represents a major step-change in the implementation of the sustainability agenda and effective responses to the Planetary Boundary challenge.


**Figure 1: The Global Goals for Sustainable Development** (United Nations permission to use)

Although the SDGs build on the earlier Millennium Development Goals (MDGs) (United Nations, 2000) by focusing on similar issues, the SDGs differ from the MDGs because they are for all countries in the world to implement – developed and developing alike (Sustainable Development Network, 2014). Also, unlike the MDGs, the SDGs are focused on monitoring, evaluation and accountability – across society, not just at national level, which is why it is critical that the link is made from the 'bottom-to-top', meaning from delivery of project level impacts that can then be assessed against the national and global targets and indicators. The research presented later shows this cannot currently be achieved, and the evidence illustrates that the golden thread from project measurement to national/global level, is missing. There is a gap.

Recent evidence from UK's Infrastructure and Projects Authority (IPA Report, 2018) suggests that projects are the major vehicle through which national level strategic change is delivered. In 2017-18 the IPA had oversight of 133 projects in the 'tip of the iceberg' of the national portfolio, representing a whole life cost of £423 billion and an annual project spend of £27 billion (IPA, 2018). This is estimated as nearly 20% of UK's national expenditure (Morris, 2017), but it could be concluded that this is just the 'tip of the iceberg', and if widened to include all change projects at all levels whether project programme or portfolio (APM, 2015), the level of spend could be many multiples of that figure. This expenditure directly impacts SDGs but currently there are inadequate mechanisms to assess how effective this is and what we need to do differently to secure a bigger 'bang for the buck'.

The core argument of this paper is that measurement of SDG impacts at project level is not currently working despite the endorsement of the SDGs by all the world's governments. The problem stems from a fundamental misunderstanding of the interdependent relationship

between business and society. The failure to appreciate this interdependence has led to sustainability being overlooked, both as a strategic opportunity for competitive advantage by firms and as a source of significant business risk. If businesses, and the projects that drive the changes needed, are to deliver their full part of SDGs by 2030, a new approach is needed.

This paper proposes the concept of 'Creating Shared Value' (CSV), first developed by leading business strategist Professor Michael Porter of Harvard Business School (Porter and Kramer, 2006, 2011), which is a unifying theory that can help rethink projects' definition of success by demonstrating impact across the triple bottom line (Elkington, 1994) of all SDGs. Projects can do this by adopting CSV because:

- Recognises the interdependence between society and business.
- Moves society and business away from zero-sum competition to positive-sum competition.
- Enables new ways for business to create competitive advantage that are more resilient against sustainability risks and mimicry by other firms.
- Combines traditional corporate social responsibility (CSR) and business operations into new integrated, and company-specific, strategies for creating shared value.

Using CSV as the strategic framework, the SDGs cease to be an additional external cost on businesses but instead become the key input for transformational business strategies that enable both business and society to flourish, even in uncertain or challenging times. The project management profession has a unique role to play in this transformation process by ensuring that projects' success is defined in the right way from the start, and that CSV opportunities are taken at all stages of the project lifecycle.

# Method

## Research procedure

The analysis has been built on a cause-effect deductive reasoning model based on four stages. For background material on conditional reasoning and causation, see the work of Cummins et al. (1991). Each stage is part of an exploratory research process to narrow the scope whilst establishing priorities for the final research design, captured in stage four. The methodology for these stages is shown in Figure 2.

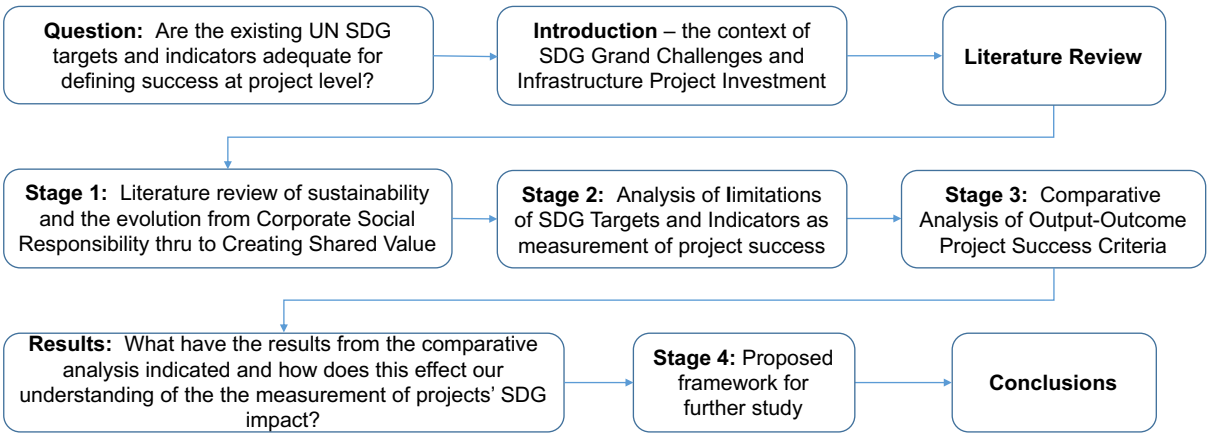



**Figure 2: Methodology for the Analysis of Measuring Projects' SDG Impact.**

## Stage 1 : Understanding Organisational and Project Sustainability Imperatives

The Association of Project Management's Body of Knowledge (PMBOK, 6th Edition, 2012) defines the boundaries of project, programme and portfolio management, and the functions undertaken as part of these endeavours. Helpfully for project managers seeking ways to measure SDG impact, it provides useful insights into how this can be achieved through its definition of sustainability as "*an environmental, social and economically integrated approach to development that meets present needs without compromising the environment for future generations*". The APM's definition has been based on the modern concept of sustainable development as derived from the Brundtland Report (1987), which suggests that efforts to create improvements in the short-term should be without a negative impact in the longer-term.

It also recognises that project strategies need to consider success against the triple bottom line (or otherwise noted as TBL or 3BL) of social, environmental (or ecological) and financial effects. However, the over emphasis on the last of the TBL criteria, namely finance, brings us to the root of the problem of measuring projects' SDG impact. This is because the crux of the sustainability reporting problem lies with the dominance of accounting tools, which has been the pre-eminent business method of reporting business success for over 500 years since Luca Paccioli first published his papers on double entry bookkeeping (Yamey, 1949). It has largely remained unchanged. As evidence of this, there has been a proliferation of mechanisms and economic models to track different elements of TBL, including: ESG (environmental, social and governance) that includes the three core areas used in the business investments measurement of ethical and sustainability impacts of a company; Social Return on Investment (SROI); Net Positive; Double and Quadruple Bottom Lines; a myriad of capital models; Full Cost Accounting; BCG's Total Societal Impact framework; Integrated Reporting; Blended and Shared Value; and, Impact Investment. Recently this has been extended to new frameworks that focus on specific issues such as Sharing and Circular Economies; the Carbon Productivity; and Biomimicry (Elkington, 2018). The contention of this research study is that the proliferation of sustainability measurement theories, tools and concepts, that are often finance-driven, causes confusion and often leads to sub-optimal action.

In 2019 the TBL theory will have its 25th anniversary and, according to its author John Elkington, is in need of 'rethinking' (Elkington, 2018). Indeed, Elkington's contention is that his definition has not been implemented according to its true meaning. Moreover, he insists that businesses should monitor and economic (not just financial), social, and environmental value added — or be negatively impacted. Many contend, as do the authors of this paper, that private sector success is still overly influence by financial perspectives. This is often restrictively linked to share price value and viewed by many (Ahmad et al., 1989) as an inherent

weakness of the system that drives short-termism in decision-making. As a result, and relevant to the assessment of how project managers can measure projects' SDG impacts, there has been a growing demand for knowledge on how sustainability reporting can be broadened whilst retaining links to competitive business advantage.

As a result of the increased knowledge and tempo of the uptake of sustainability language, it has become more mainstreamed with many academics (Tilt, 2007) and practitioners (Perrini and Tencati, 2006) seeking to further develop from an accounting-centric method towards a broader approach, such as the Balanced Scorecard (Kaplan and Norton, 1996). Whilst there has been a proliferation of sustainability accounting terminology (sustainability accounting is also known as: social accounting, corporate social reporting, corporate social responsibility reporting, social and environmental accounting, and non-financial reporting), the project world is still mired in confusion; this is because although the APM's definition of sustainability is aligned to the TBL in general, it is rare that a project's outcomes are defined comprehensively along all TBL thematic areas, with an understanding an understanding of these as a genuine competitive advantage. Indeed, the previous analysis of the definition of project success highlights the excessive reliance on the project outputs of time, cost and scope, with less importance placed on the broader (or more holistic) TBL outcomes.

**Corporate Social Responsibility (CSR) to Creating Shared Value (CSV)**

'Creating Shared Value' (CSV) (Porter and Kramer, 2006, 2011), is a unifying theory that can help us to rethink the definition of project success by demonstrating impact across the triple bottom line (Elkington, 1994) of all SDGs, at all levels and stages of a project. Using CSV as the strategic framework, the SDGs cease to be an additional external cost on business but instead become the key input for transformational business strategies that enable both business and society to flourish, even in uncertain or challenging times. The project management

profession has a unique role to play in this transformation process by ensuring that projects' success is defined in the right way from the start.

CSV is based on three key insights: (i) the interdependence of business and society (Porter and Kramer 2006); (ii) that businesses must act in specific ways to achieve their performance rather than on generalised CSR aims; and (iii) that CSR – the traditional mechanism for delivering the sustainability activities of business – is both inefficient and ineffective (Porter and Kramer 2006). Since business and society are interdependent, the best outcomes for each will be obtained when businesses develop strategies that integrate social needs with real commercial opportunities and *vice versa*. However, most sustainability efforts to-date have focused on the identification of harms to society in general and the creation of corporate responses to meet those harms as described in general. As a result, many sustainability efforts have been largely divorced from the specific business model of each organisation. In reality, sustainability activities have often functioned as additional actions for the purposes of deflecting stakeholder criticism, conducted regardless of their actual relevance to the business' capabilities, suppliers or customers. The net effect is to leave core business activities and risks unchanged. The nub of Porter's argument is that CSR is both inefficient and ineffective: inefficient because it creates irrelevant 'add-on' activities that add to the costs of doing business without adding to the real value created for any of the business' stakeholders, or removing real business risks; ineffective, because it continues to pit society and business as opposing forces rather than recognising the opportunities of their real interdependence.

Importantly, CSV is not just a concept of how business should be, but a method for the development of business strategy (Porter, 2015). CSV enables companies to develop successful strategies that combine their specific array of resources, capabilities and value chain relationships to produce unique value propositions that produce competitive advantage for

firms. As Porter points out (Porter and Kramer, 2006), 'the worst error in strategy is to complete with rivals on the *same dimensions'* (their emphasis).

CSV also enables a new understanding of the SDGs. Under shared value strategies, the SDGs become a framework for each business to discover its unique shared value proposition, rather than being an additional external cost on business. CSV strategies can also be cascaded to the project level because they provide a mechanism to better define project success, including time, cost, scope (and quality) and broadened to consider the societal and environmental aspects. The core proposition of this paper; that CSV is not just at organisational level theory, but also relevant at the portfolio, programme and project levels, that project managers are critical to its delivery but lack appropriate tools.

One aspect of business' scepticism about sustainability is the perceived constraints on business action. Businesses are not always as able to act to implement activities that work towards the SDGs as some of them would like. For example, a very recent Deloitte report (Deloitte, 2018) finds that even though top executives see the issue of inclusive growth as increasingly important (2nd most important issue after technology and competitiveness) they feel limited in their ability to act effectively. Only 17% of businesses in that survey believe that their current initiatives will help achieve the SDGs by 2030, a very low baseline on which to base effective action. Even worse than viewing their sustainability actions as having limited outcomes, many companies are now judging their own sustainability efforts as actually failing. Bain's recent report (Bain, 2018) finds that nearly half of all sustainability programmes that companies operate are considered a failure by those firms themselves. Even more of a concern, this failure rate has doubled since 2016. Deloitte (Deloitte, 2018) identifies that 'one-size-fits-all' approaches to sustainability are not working for business.

Despite the general lack of interest in sustainability as a strategic opportunity for competitive advantage, risks from sustainability are gaining increasing strategic attention. In October 2011,

a McKinsey report recommended that firms start identifying the business risks from climate change and resource scarcity (McKinsey, 2011). Businesses around the world are now identifying their major risks to be sustainability issues even if these risks are not described as sustainability language.

Ameliorating many of these risks can only be achieved through investment in appropriate, and resilient, infrastructure and engineering. Greenhouse gas emissions cannot be sufficiently reduced without new forms of energy infrastructure or less polluting transport networks, to name but two; water security requires investment in new and more resilient forms of water infrastructure. A formal recognition of the ability of engineering and infrastructure to reduce strategic business risk would benefit everyone – business, engineering and society.

**Stage 2: Limitations of SDG Targets and Indicators as measurement of projects' success**

This stage includes the analysis of how the UN SDGs are currently defined by internationally agreed targets and indicators and whether this measurement framework can be used at project level. The research seeks to explore why there is an apparent missing link between project delivery and SDG targets/indicators and what this gap means for projects' success.

As described earlier, the 17 SDG are defined by 169 targets. This was further delineated by UN Statistical Commission's Interagency and Expert Group on SDG Indicators (IAEG-SDGs) in 2016, when they agreed to include 244 individual indicators to monitor the 169 targets of the SDGs. This increased granularity of definition is both good and bad. There are many that criticise the SDGs for being too broad and deep – ultimately being impenetrable except for the deep-specialist. Conversely, the advocates suggest that the 17 SDG icons provide the communications medium for ensuring simplification, enabling the simplest messages to be kept to 17 powerful, interlinked, themes. They also contend that the targets and indicators are needed to add viability for evidence-based measurement to ensure meaningful tracking of

progress against a pre-determined baseline, such as for climate change (IPCC, 2018), where the pre-industrial age temperature levels and related gas emission pathways as a proxy for its objective to reduce global warming below the $1.5^0$C levels by 2030). The naysayers challenge the assertion that the targets and indicators are fit for purpose by suggesting that they are inconsistent, difficult to quantify, implement, monitor, report and learn lessons from. They also challenge the governance of the SDG oversight mechanism because the goals are non-binding, with each nation creating their own national or regional plans. Moreover, the source(s) and the extent of the financial resources and investments for the SDGs are ambiguous.

In Swain's 'A Critical Analysis of the Sustainable Development Goals' (2018), he identifies tactical and operational issues for the strategic managers of projects to contend with. These include: (a) what are the interdependent relationships between SDGs to prevent them being assessed in silos?; (b) how can the targets and indicators that were designed for national and global level reporting be cascaded down to project level?; and (c) how do the SDG targets and indicators compare with existing targets provided by other industry standards' sustainability reporting mechanisms, such as by the Global Reporting Initiative (GRI) (see www.globalreporting.org), or project-specific sustainability tools such as UK's Buildings Research Establishment's CEEQUAL (https://bregroup.com)?

The UN's Agency Expert Group on Targets and Indicators for Sustainable Development designed a mechanism that linked goals, targets and indicators across the geographic and governance overlapping boundaries at national, regional and global levels. Within this framework, as shown in Figure 3, the Expert Group designed thematic areas that could also be used at the sub-national level. However, the further the granularity was cascaded the more the framework has inevitably become over-complicated and difficult to use by practitioners due to its scientific and statistical complexity, as well as its complex interdependencies.

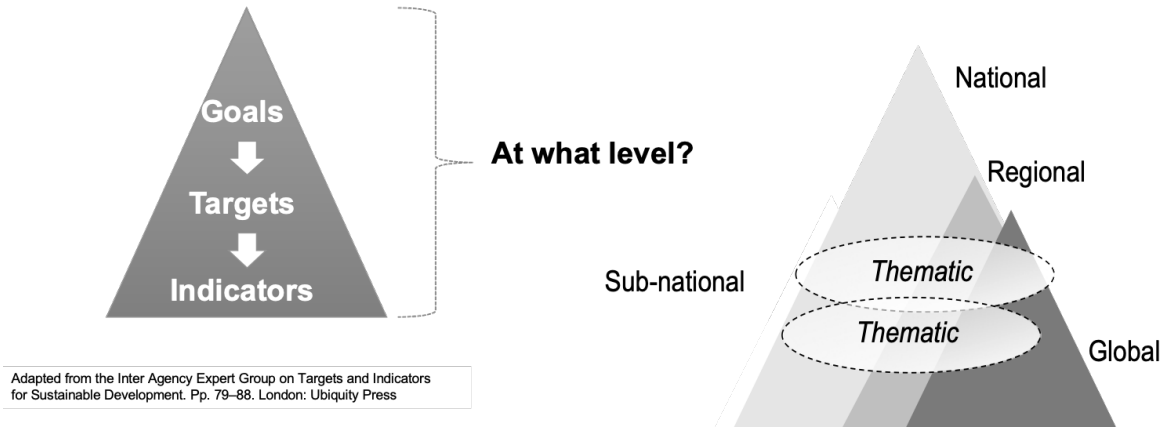



**Figure 3: SDG Targets and Indicators' Framework**

To assess the usability and applicability at the project level this high-level framework has to be considered by its relevance on a sector-by-sector basis. For example, in the infrastructure sector, recent analysis (Hall et al., 2018) has provided some confidence that the higher-level targets do have influence at the project level. The analysis indicates that 81% of the SDG targets are influenced by infrastructure investment projects. However, despite the positive conclusion from the ITRC's analysis (2018), there is conflicting evidence that the measurement is achievable at the Interagency and Expert Group on SDG's (IAEG-SDG) Indicators level, where a further 244 measurement metrics reside. For example, the UK's Office for National Statistics (ONS), responsible for reporting UK's progress against global SDG indicator measurement, shows that in October 2018 they only had data for 64% of the IAEG-SDG's indicators, with 9% of statistics 'in progress' and 27% with no data available.

The challenge of collating reporting evidence for the 244 indicators noted by the ONS was further corroborated by recent analysis (Mansell, 2018) of the applicability of using each of 232 (narrowed from removing overlaps with the 244) indicators for project-level measurement of success. An analytical grid framework was developed by the main author to assess the relevance of SDG Targets and Indicators to engineering projects and organisational goals to determine what could be measured either quantitatively or qualitatively (see Figure 4 below). Whilst this study is only an example of exploratory research it does provide indications of

where the problem might lie and what refined research techniques could be used to build robust quantitative and qualitative evidence at a later stage.

Analysis of how the UN's SDGS are currently defined, and their applicability at project level, was based on inductive reasoning using the project success framework developed by Peter Morris (2013) and Cooke-Davies (2007) and then analysed against the Cost-Benefit measurement framework from the HMT Green & Orange Book (HM Treasury, 2013). The Green Book approach was also balanced by using the World Bank Monitoring, Reporting, Evaluation and Learning methodology as outlined in the 'A Guide to Using Qualitative Methods and Data' (International Bank for Reconstruction and Development, World Bank, 2006).

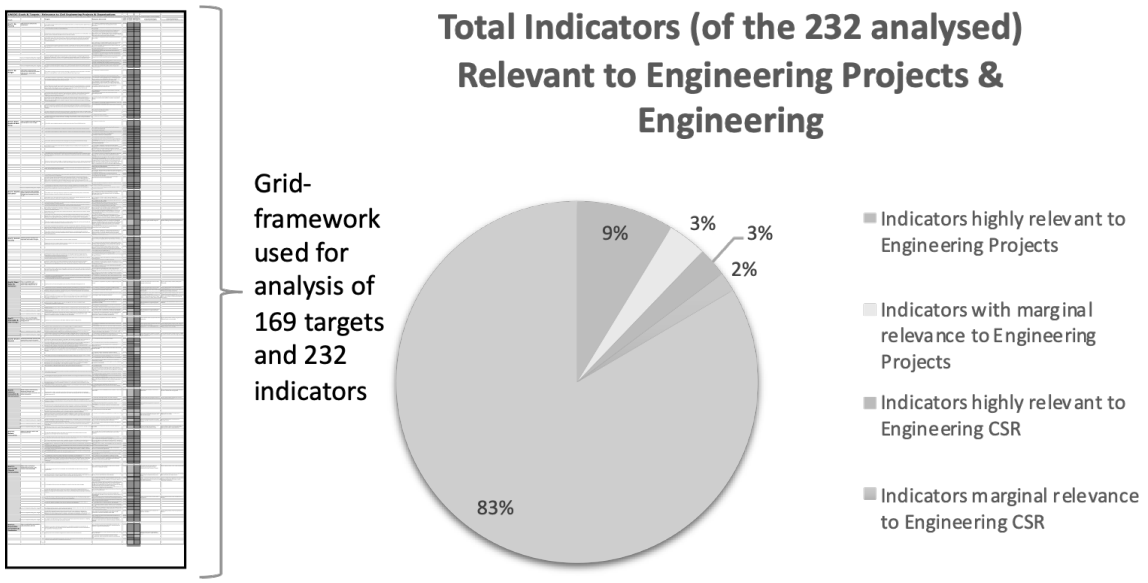


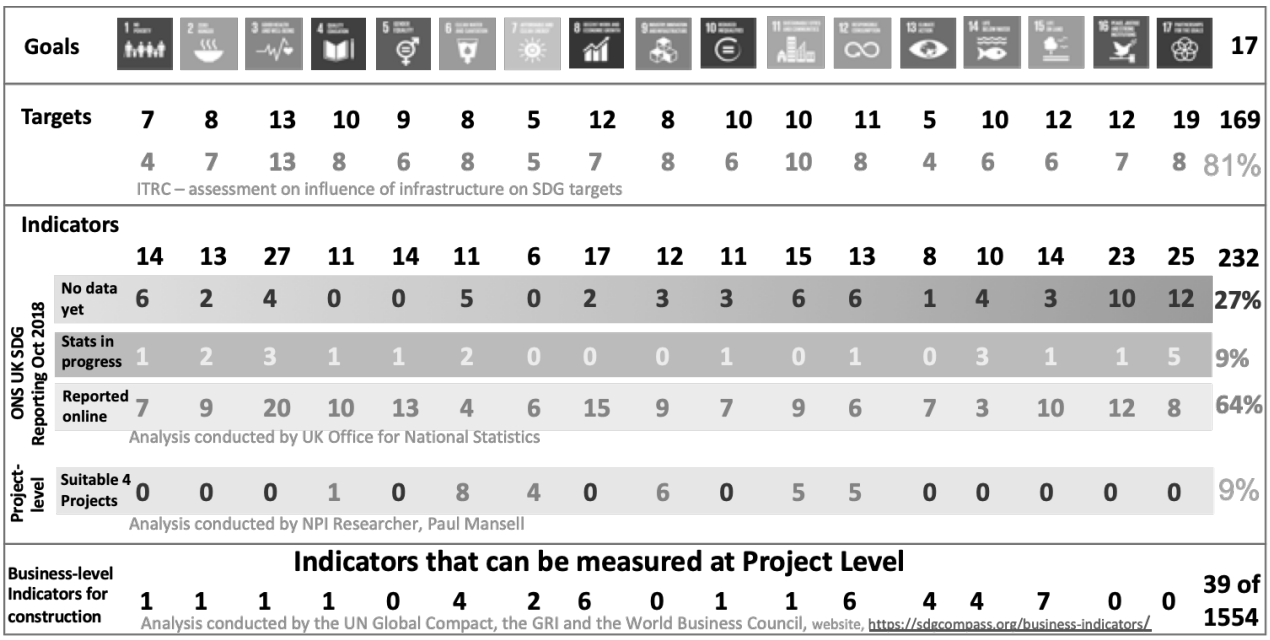

**Figure 4: Analysis of the SDG Targets and Indicators' measurability**

In summary, the criteria of analysis were: did the indicator fulfil SMART principles (Doran, 1981) of being specific (focus on a specific area for improving), measurable (quantifiable that gives indication of progress), assignable (the person responsible for doing it), realistic

(realistically achievable with the time and resources available), and time-related (when can a result be achieved by). George Doran (1981) noted that the important point related to use of SMART principles for the analysis of relevance of the SDG indicators to measure projects' SDG impact, was that these criteria should not imply that all objectives must be measured quantitatively on all levels of management. In many situations it is unrealistic to do this. For instance, project managers should focus on an action plan to achieve an objective instead of just focusing on the objective.

The results of this analysis against SMART targets, using the theoretical frameworks from Cooke-Davies and Morris as well as the management frameworks of the World Bank, showed that 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 agreed UN Indicators, and 4% (N = 8) have marginal relevance.

The mapping of the three areas of analysis, by the ITRC, the ONS and by this paper's main author, is shown in Figure 5. The analysis illustrates that although the work done by UNOPS and ITRC at the SDG targets level, suggests that infrastructure can influence 81% of the targets, measurement is significantly more challenging at the Indicator level. The final row of Figure 5 shows the researchers' analysis of the UN Global Compact's data (a collaborative venture between the GIR and the World Business Council) of sustainability reporting indices. This suggests that only 39 of their 1,554 indicators can be measured at project level. Overall there is a very large gap between global definitions of SDG objectives and project-level definitions of action.




Source: Paul Mansell, Measuring Infrastructure's SDG Impact at Project Level, LSBU. *Oct 2018; Target linkage to Infrastructure from ITRC, Sep 18; Indicator Measurement from UK ONS, Oct 2018; Business Indicator data from* UN SDG Compass – Inventory of Business Indicators, website, https://sdgcompass.org/business-indicators/ using selected GRI G4 Construction & Real Estate

**Figure 5: Analysis of the SDG Targets and Indicators' measurability**

Selective use of the 'traceable' indicators from the four studies might provide a manageable 'entry point' to assess projects' SDG impact measurement, but the gap is too large to be credible. Therefore, there is a need to look at other ways of achieving the golden thread linkage from projects' outcome measurement to the globally agreed SDG targets and indicators. This might be by using or adapting other TLB measurement mechanisms that are already in use, such as the GRI reporting framework, or the BRE's CEEQUAL sustainability reporting method.

### Stage 3: Definition of Project Success Criteria and Comparative Analysis of Output-Outcome Success Criteria

This section of the research developed the study of project success further through a comparative analysis of output-outcome success criteria. While project success is a heavily

researched field of study within the field of project management (see for example the work of Thiry, 2004; Sward, 2006; Jenner, 2010), the quantitative analysis of success criteria and their alignment to outputs or outcomes, is less evident. Therefore, the aim of this step was to collate studies that identified the causal output-outcome factors that influence projects' success and failure. The reason for compiling a list of success and failure criteria was because they indicate what factors are managed by project leaders to drive delivery success. This in turn, when analysed against output or outcome definitions, provides an insight into whether the projects' success is aligned to criteria of the management of the project (outputs), or more importantly, to the wider stakeholder perception of the change (outcomes) enabled by the projects' completion. Simply put, project managers are overly focussed on the iron triangle of time, cost, scope (and quality) instead of the longer-term benefits that a project enables.

Research into 'project success' indicates that it is one of the most frequently reported subjects of project management study in recent decades. For example, in Themistocleous and Wearne's study (2000) of project management topic coverage in journals, they identified 'success criteria' as the ninth most popular subject area of the forty-four topics from the International Journal of Project Management. More recent research into project success definition (Thiry, 2004; Sward, 2006; Jenner, 2010; Bradley, 2010a and 2010b; Lavagnon, 2009) has consistently identified benefits and outcomes as being a critical determinant for the assessment of project success. For example, Michael Thiry (2004) 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 (Morris, 2013; Terry Cooke-Davies, 2002, 2007) who identify three levels of success criteria: project management success – was the project done right?; project success – was the right project done?; and consistent project success – were the projects done right, time after time?

To understand the limitations of defining project success in the narrower method, it is necessary to understand the profession of project management, that at its core, is a discipline that focuses on the start, delivery and completion that often transitions into operations with the initiation, development and delivery of projects. Projects are also temporary organisations that have a well-recognised development process, referred to as the project life cycle (Morris, 2017). To achieve its 'ends', 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 (Morris, 2017). This is important to resolve because of the huge investment across all projects to effect successful change. For example, the UK's National Audit Office indicates that about 20% of GDP (gross domestic product) is committed to projects (see NAO Report Projects, 2017), and the pace and scale of this change is increasing. As a result, there is a growing need for the project management sector and profession to focus more on 'ends' rather than just the 'means'. In the case of impacting SDGs, this requires it to ensure that its contribution is the most valuable for the economy, society and the environment, meeting TBL needs in the competitive business context of CSV.

Although research into Critical Success Factors has become increasingly prevalent in recent years, most of the studies actually indicate a divergence of understanding. For example, Miller and Lessard (2000) suggest there an excessive focus on success of managing projects, and less on their benefits/outcomes. Their study analysed sixty large engineering projects of costs in excess of USD $1Bn that performed poorly: '*close to 40% of them performed very badly; by any account, many are failures*'. This was despite 82% achieving their cost targets and 72% achieving schedule targets. These different views of results were characterised by Miller as

having a focus on '*efficiency measures*' but he suggests that in fact, there needs to be an even more important characterisation using '*effectiveness measures*' that assessed whether they delivered against their original vision and objectives? Using these latter effectiveness measures, only 45% achieved their investor's objectives, 18% without crisis, whilst 17% needed restructuring, with 20% being abandoned or taken over. The relevance for this research into projects' SDG impact measurement is that the study (one of the 35 reviewed in this paper's research) identified the difference between tracking the *project management success,* as different from the actual *project's success*.

The selection of which studies to use for this phase of research was based on harnessing the existing research studies that had been compiled by leading academics in this field. The use of 35 separate studies was selected from the list of 88 studies compiled by Professor Peter Morris (2013). The choice of study samples from Professor Morris' list was based on seeking a spread of *ca*. 10% across the Middle East, Africa and Asia, but with the majority (*ca*. 60%) being from Europe and North America. The reason for this geographical spread was to seek a core of similar cultural and professional frameworks that would provide greater consistency to the analysis, whilst also having some examples of different global project environments that might indicate cultural or value-based differences. The selection of which studies to include was also influenced by identifying studies that came from four primary categories: construction (N = 8), IT (N = 7), R&D/new product development (N = 6), and defence (N = 4). In particular, the construction sector projects are important because they are the sample set that is carried further in subsequent research beyond this paper, and as such, could provide a useful insight into any stand-out characteristics that might be of value to deepen subsequent research.

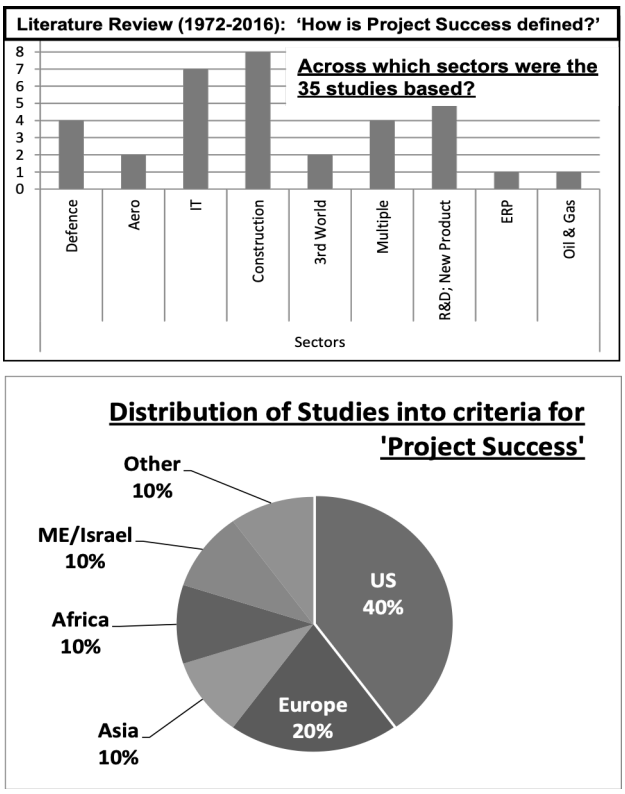



**Figure 6: Distribution of Project Success Studies by Sector and Geography (graphs by author)**

The method chosen to structure the data analysis was to build a MS Excel grid that plotted the 154 success criteris from the 35 separate studies. The 154 success criteria were grouped under sixteen dimensions derived from the APM's PM BOK (also captured in the OGC's 2006 P3M3 Maturity Model, that focused on seven process perspectives), the PMI's PM Book of Knowledge (as well as its OPM3 Maturity Model), and the IPMA's standards that define projects. The 16 dimensions were: leadership, governance, strategy/goals/objectives, risk, cost estimation, benefits/value, control & change management, quality management, client & user involvement, suppliers, stakeholder engagement and communications, funding, planning, HR/resources, procurement, monitoring & evaluation, technical, and innovation. The grid then placed each study into a column and allocated the identified success criteria against each of the normative dimensions. A copy of the matrix is shown for illustratively purposes in Figure 7.

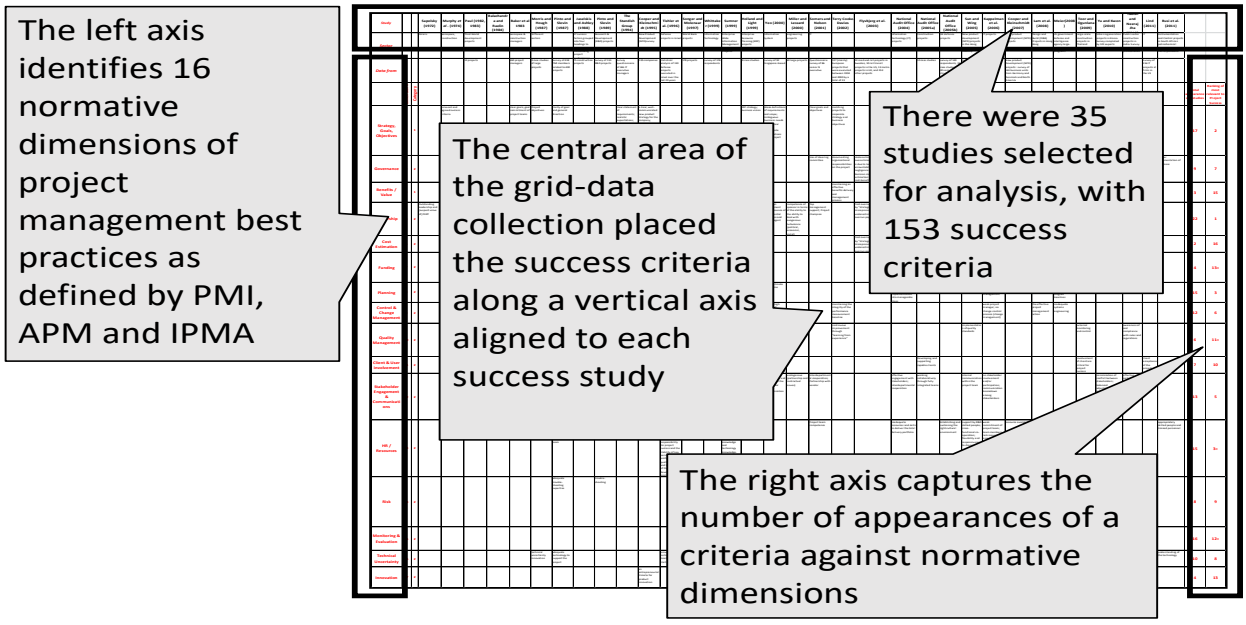



**Figure 7: Data Capture Grid of 35 Studies' Success Criteria (1972-2016)**

## Results and Discussion

The summary of the exercise to map the success criteria to the normative dimensions is shown in Figure 8. The final two columns in this summary sheet (total appearances in the studies and the ranking of most appearances) indicates the precedence of success criteria. The second column shows the number of criteria that could be termed as 'outcome' specific (Miller and Lessard 2000; Cooke-Davies, 2002 and 2004).

| Project Success Dimensions (from PMI, APM 's Themes) | Outcome Success | Total appearances in studies | Ranking of most appearances in studies |
|---|---|---|---|
| Leadership | yes | 22 | 1 |
| Strategy, Goals, Objectives | yes | 17 | 2 |
| Planning | no | 15 | 3= |
| HR / Resources | no | 15 | 3= |
| Stakeholder Engagement & communications | yes | 13 | 5 |
| Control & Change Management | no | 12 | 6 |
| Technical Uncertainty | no | 10 | 7 |
| Governance | yes | 9 | 8 |
| Risk | no | 8 | 9 |
| Client & User involvement | yes | 7 | 10 |
| Quality Management | no | 6 | 11 |
| Monitoring & Evaluation | yes | 6 | 12 |
| Funding | no | 4 | 13= |
| Innovation | yes | 4 | 13= |
| Benefits / Value | yes | 3 | 15 |
| Cost Estimation | no | 2 | 16 |

**Figure 8: Summary of analysis from the grid-mapping of criteria against dimensions**

The analysis of summary chart shows that only half of the dimensions relate to the delivery of benefits and outcomes. Of these, only two of them (Strategy, Goals, Objectives; and, Leadership) were in the top quartile; three (benefits/value, innovation, and monitoring & evaluation) were in the lowest quartile. There were two important findings from the analysis: (1) None of the studies included sustainable development. (2) By understanding which of the dimensions were related to Miller and Cooke-Davies' Level 2 (only eight of them), the research established that half of the 35 studies focussed on project 'efficiency' and only half focused on the more critical outcomes of the projects. This might show that past research has been too preoccupied with studying the management of projects and needs to increase the study of the effectiveness, because ultimately, if you deliver to time and cost without meeting the wider benefits, such as relevant SDGs, the value of the project delivery is likely to be sub optimal. There are those (Thiry, 2004; Bartlett, 1998; Jenner, 2010; Sward, 2006; Bradley, 2010) that we must move more of the research from the old focus on doing 'projects right' towards a greater emphasis on 'doing the right projects'. The significance for this study is that the majority of success factors in future should be defined through the lens of outcomes, such as SDG and the evaluation against the Triple Bottom Line, in the context of a CSV framework.

**Stage 4 - A proposed agenda for further research**

As a deduction from these three steps, it is posited that the shared value approach, aligns individual business priorities of specific firms with sustainable development imperatives. Consequently, CSV is capable of releasing the energies of business to pursue competitive advantage and the SDGs through integrated business strategies. As such, CSV is also a valuable part of the context for projects, and we therefore propose two models to support further research

in this area. The first model (Figure 9) provides a hierarchy that enables more precise focus on the project level measurements, cascaded from the national and global level targets and indicators. This provides a framework that allows further investigation to be focused on the specific challenges at the project level. For example, it is not realistic to propose changing the global and national targets, but it might be appropriate to design some new indicators, across the TBL, that have relevance at project level and ideally, show an evolutionary development approach from what is currently used today in the measurement of sustainability on projects, such as BRE's CEEQUAL methods.

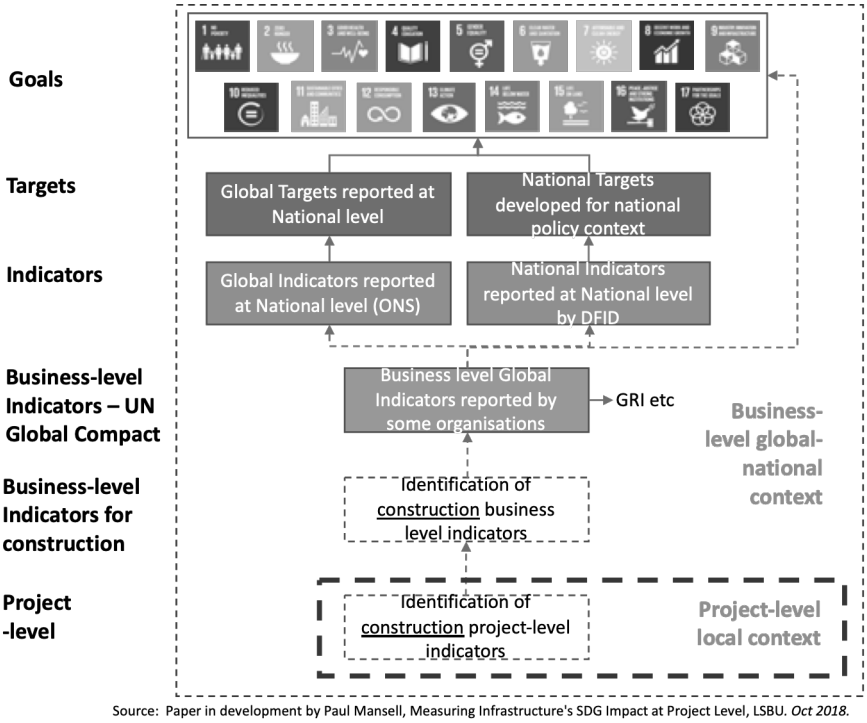



**Figure 9. Conceptual Framework for Analysis of SDG Target and Indicator hierarchy**

The second model (Figure 10) is derived from a similar framework developed by the ITRC (2018), and uses it for the analysis of infrastructure specific projects. The model illustrates the relationships between stakeholders (on the right axis) and the lifecycle of the projects (in the lower part of the diagram). It also shows the reporting lines for the Monitoring, Reporting, Evaluation and Learning, on the left side.

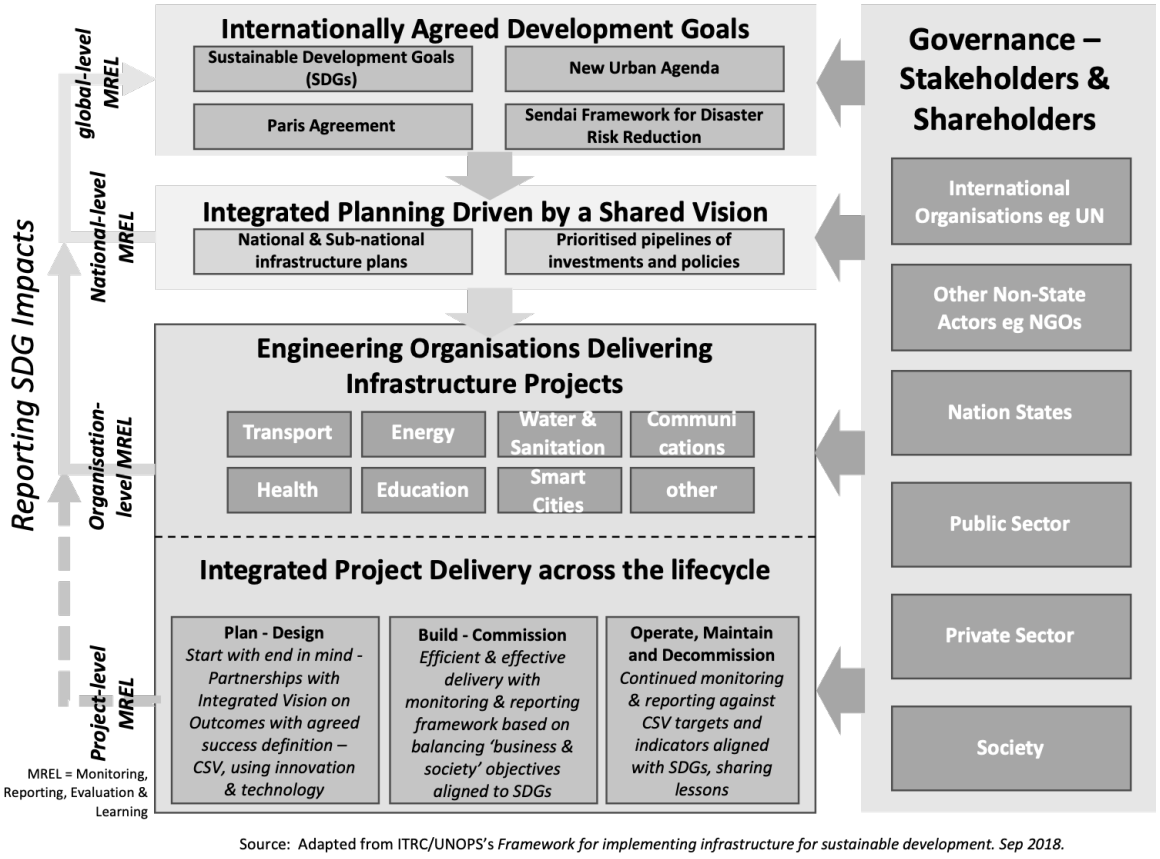



**Figure 10. Conceptual Framework for Analysis of SDG Measurement - stakeholder and governance relationships.**

It is proposed that further research integrates the two frameworks to develop an improved understanding of the organisational context within which the definition and measurement of infrastructure project success is made. It should examine the leadership and governance theories and relationships that underpin the overall analysis of project success definition and measurement. For example, recent studies (Muller, 2017) have provided clarity on how project governance, that shapes the reporting, directing and management of projects, is best understood by scrutinizing the overlapping influences of corporate governance at the organisational level and the separate, but related, governance at project level that has its own customs, rules and approaches for reporting project success.

## Conclusions and Future Work

This paper has used comparative analysis of existing research data combined with analysis of current SDG reporting norms to argue that several factors are now combining to create a compelling business case for finding new ways to measure projects' impact on the SDGs. These factors are:

- The increasing recognition that sustainability failures are a key business risk globally, for which the provision of resilient infrastructure is a necessary response;
- The evidence of national target and indicators being inappropriate at local, project, level;
- The concept of 'creating shared value', proposed by leading business strategist Professor Michael Porter. When properly understood and integrated with the SDGs, CSV opens up new opportunities for the creation of competitive advantage for all businesses – and can be developed into a new way of measuring project success against the TLB.

The paper contends that achievement of the SDGs is dependent on business aligning with society through CSV, and that tools at project management level are critical for this. While the endorsement of the SDGs by all the world's governments is a major step forward, current progress on achieving the SDGs has been limited by a fundamental misunderstanding of the interdependent relationship between business and society. CSV corrects this misunderstanding, and is being increasingly adopted by firms, but the golden thread from projects to SDG targets is still missing. The end result of this gap in knowledge is the wrong choice of projects' success definition, based on outputs, not on 3BL outcomes. Hence the next stage of this doctoral research will address the tools gap.

The limitations of this exploratory research phase are that it has not provided definitive findings. Whilst it has helped to narrow the scope of future research by establishing priorities for the final research design of the ongoing doctoral studies, the comparative analysis of literature is too narrow to make final conclusions. It should thus be viewed only as a sign-post for further research, potentially through the use of a case study to build more detailed qualitative and quantitative data that the findings of the exploratory research can be tested against.

In this way, the research will likely provide more meaningful insights into how infrastructure investment can be better focused and lessons that increase impact across SDGs will be applied more effectively. Infrastructure projects have always been an essential underpinning for society, but today's global business context gives new weight to infrastructure's importance, and this approach of measuring SDG impact at the project level provides a golden thread to link the projects' delivery outcomes with national and global SDG targets. However, if projects do not widen the definition of success to incorporate SDG impacts, they will fail to accommodate the unique enabling role of engineering and infrastructure, inadvertently weakening the resilience and wellbeing of both business and society.

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## Appendix – Data Capture in Grid Analytical Framework

This is the first page of 3 'cuts' of a single grid-data-capture framework.

| *Study* | | | Sapolsky (1972) | Murphy *et al*. (1974) | Paul (1982, 1983) | Balachandra and Raelin (1984) | Baker et al 1983 | Morris and Hough (1987) | Pinto and Slevin (1987) | Jaselskis and Ashley (1988) | Pinto and Slevin (1989) | The Standish Group (1994) | Cooper and Kleinschmidt (1995) | Tishler et al. (1996) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Sector* | | | Polaris | aerospace, construction | Third World development projects | | aerospace & construction managers | different sectors | | 27 success factors grouped into four headings to achieve outstanding project performance | Research & Development (R&D) projects | | New Product Development (NPD)survey | Defense projects in Israel |
| *Data from* | | | | | 12 projects | | 650 project managers | 8 case studies of large projects | Survey of 418 PMI members related to 400 projects | 75 construction projects | survey of 151 R&D projects | Survey questionnaire of 365 IT executive managers | 135 companies | statistical analysis of 110 defense projects executed in Israel over the last 20 years |
| | Dimension # | Category | | | | | | | | | | | | |
| Strategy, Goals, Objectives | 1 | 1 | | relevant and agreed success criteria | | | clear goals; goal commitment of project teams | Project objectives | clarity of goal and general direction | | | clear statement of requirements; realistic expectations; clear vision & objectives | a clear, well-communicated new product strategy for the company; strategic focus and synergy (i.e., new products close to the firm's existing markets and leveraging existing technologies) | |
| Governance | 2 | 2 | | | | | absence of bureaucracy | | | experience and authority | | ownership | senior management accountability | |
| Benefits / Value | 3 | 1 | | | | | | | | | | | | |
| Leadership | 4 | 2 | Outstanding leadership and [suspect value of] PERT | | Political commitment; leadership | project manager as project champion | on-site PM | | top management support | project manager's capabilities | top management support; characteristics of the project team leader | executive management support | senior management commitment to new products | |
| Cost Estimation | 6 | 2 | | | | | accurate initial cost estimates | | | | | | | |
| Funding | 7 | 2 | | | capital | | adequate funding to completion | | | | | | adequate resources for new products | |
| Planning | 8 | 2 | | | structure and control | | | schedule duration urgency | clarity of project schedule/plan | | | proper planning; smaller project milestones | | |
| Control & Change Management | 9 | 2 | | | | | | | monitoring and feedback | project planning and control effort | monitoring and feedback | | high-quality new product process | |
| Quality Management | 10 | 2 | | | | | | | | | | | | attention to design considerations (produceability, quality, reliability, and design to cost) in the early phases of development |
| Client & User involvement | 11 | 2 | | | | | | | client acceptance of finished product | | client acceptance | user involvement | | |
| Stakeholder Engagement & Communications | 12 | 2 | | | | technical/marketing relations | | community involvement | client consultation; adequate channels of communication | | client consultation; communication | | | |
| HR / Resources | 13 | 2 | | team build up | | | adequate team capability | | personnel issues, including recruitment, selection, and training of the team | the stability of project team | competent staff; hard-working and focused staff | | high-quality development teams; cross-functional teams | the customer follow-up team members' professional qualifications, sense of responsibility for project success and the stability of key personnel; the professional qualifications and team spirit of the development team |
| Risk | 14 | 2 | | | | | | | adequate trouble-shooting expertise | | trouble-shooting | | | |
| Monitoring & Evaluation | 15 | 1 | | | | | | | | | | | | |
| Technical Uncertainty | 16 | 2 | | | | | | technical uncertainty innovation | adequate technology to support the project | | | | | proven technological feasibility at the start of a project |
| Innovation | 17 | 2 | | | | | | | | | | | an entrepreneurial climate for product innovation | |

| Songer and Molenaar (1997) | Whittaker (1999) | Sumner (1999) | Holland and Light (1999) | Yeo (2000) | Miller and Lessard (2000) | Somers and Nelson (2001) | Terry Cooke-Davies (2002) | Flyvbjerg et al. (2003) | National Audit Office (2004) | National Audit Office (2005a) | National Audit Office (2005b) | Sun and Wing (2005) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| World Bank projects | Information Technology | Enterprise Wide Information Management Systems Projects | Enterprise Resource Planning (ERP) projects | Information System | engineering projects | IT | | | Information Technology (IT) projects | Construction projects: | UK defence projects | New product development (NPD) projects in the Hong Kong toy industry |
| 178 projects | survey of 176 respondents | | 8 case studies | survey of 92 Singapore-based | 60 large projects | Questionnaire survey of 86 senior IS executive | 137 (mainly) European projects that were executed between 1994 and 2000 by a total of 23 organizations | 22 road and rail projects in Sweden, 10 rail transit projects in the US, 13 metro projects in UK, and 253 other projects | | 10 case studies | survey of 140 respondents, 19 case studies and 30 semi-structured interviews | survey |
| | | | | | | | | | | | | |
| | | | ERP strategy; business vision | Weak definitions of requirements and scope; Ambiguous business needs and unclear vision; Incomplete specifications when project started | | Clear goals and objectives | matching projects to corporate strategy and business objectives | | clear link between the project and the organisation's key strategic priorities including agreed measures of success; Clear goals and objectives | | | clearly defined target market; clear project goal |
| | | | | | | Use of steering committee | documenting organisational responsibilities on the project | Underestimation of cost and overestimation of demand is due to lack of accountability and risk negligence in promoters' decision making (under-estimation looks good in cost-benefit studies) | | | Creating clear structures and boundaries | |
| | weak business case | | | | | | maintaining an effective benefits delivery and management process | | | Basing design and decision making on "whole life value" | | |
| institutional environment | a lack of top management involvement and support | Support of senior management | top management support, | Top down management style; Absence of an influential champion and change agent | competence of sponsor in terms of the ability to the ability to deal with exogenous turbulence (political, economic, social) | Top management support; Project champion | | Cost overrun best explained by "strategic misrepresentation", cost underestimation and overrun pay-off. | clear senior management and leadership | | | leadership of project leader |
| | | | | | | | | Cost overrun best explained by "strategic misrepresentation", cost underestimation and overrun pay-off. | | | | |
| | | | | | | | | | Evaluation of proposals driven by initial price rather than long-term value for money (especially securing delivery of business benefits) | | | |
| design | Information Technology (IT) projects: survey of 176 respondents | | project schedule and plans | Underestimate of timeline | | | | | Too little attention to breaking development and implementation into manageable steps | Scheduling | | |
| coordination | | | monitoring and feedback | Involve high degree of customisation in application | | | maintaining the integrity of the performance measurement baseline | | | | | |
| | | | | Changes in design specifications late the project | | | continuous improvement through "learning from experience" | | | | | implementation of quality standards |
| | | | | Consultant/vendor underestimated the project scope and compl | | | | | | Developing and supporting capable clients | | |
| | | | client consultation; client acceptance; communication | Lack user involvement and inputs from the onset; Poor internal communication | endogenous (partnership and contractual issues) | Interdepartmental cooperation; Partnership with vendor | | | effective engagement with stakeholders; Interdepartmental cooperation | working collaboratively through fully integrated teams | | internal communication within the project team |
| training | | investment in user training; use of "business analysts" with both business knowledge and technology knowledge. | personnel | | | Project team competence | | | Inadequate resources and skills to deliver the total delivery portfolio | | Establishing and sustaining the right cultural environment | support by R&D skilled people; cross-functional co-operation; flexibility and responsiveness to change |
| | | redesign of business processes to "fit" what the software will support | trouble shooting; Business Process Change (BPC) and software configuration | Inadequate project risk analysis; Incorrect assumptions regarding risk analysis; Reactive and not pro-active in dealing with problems | | | adequacy of company-wide risk management education; maturity of risk allocation processes; maintaining a visible risk register; maintaining an up-to-date risk management plan | | skills and proven approach to project management and risk management | | | consider issues at early stage |
| monitoring | | | | | | | establishing metrics for direct feedback on project performance and success | | | Evaluating performance and embedding project learning | Measuring progress and making decisions; Reporting to enable strategic decisions | |
| | | avoidance of customization | legacy systems | Inappropriate choice of software | | | | | | | | |
| | | | | | | | | | | | | innovativeness of the product to the market; ideas generation by brain storming |

| Kappelman et al. (2006) | Cooper and Kleinschmidt (2007) | Lam et al. (2008) | Meier(2008) | Toor and Ogunlana (2009) | Yu and Kwon (2010) | Tabish and Neeraj Jha (2010) | Lind (2011) | Busi et al. (2011) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| IT projects. | New product Development (NPD) projects | Design and Build (D&B) Projects in Hong Kong | US government defense and intelligence agency large-scale acquisition programs | Large-scale construction projects in Thailand | Urban regeneration projects in Korea. Survey completed by 122 experts | Public sector construction projects in India. Survey of 105 professionals | IT | Instrumentation and Control projects in South African petrochemical industry. Survey of 110 respondents | | |
| panel of 19 experts and a survey of 55 IT project managers | New product Development (NPD) projects : survey of 161 business units from Germany and Denmark and North America | | | | | | Survey of 116 IT projects at firms in the US | | | |
| | | | | | | | | | Total appearances in studies | Ranking of most relevant to Project Success |
| lack of documented requirements and/or success criteria | the new product strategy for the business unit | | lack of corporate technology roadmaps; ineffective acquisition strategy | | | clarity in scope | clarity of goals and mission | | 17 | 2 |
| | | | | | | | | proper documentation of decisions | 9 | 8 |
| | | | | | | | | | 3 | 15 |
| lack of top management support | | | overzealous advocacy | | | | | | 22 | 1 |
| | | | | | | | | | 2 | 16 |
| | | | | | | | | | 4 | 13= |
| ineffective schedule planning and/or management | a high-quality new product process | | requirements instability; unrealistic program baselines | project planning and control | | pre-project planning | | | 15 | 3 |
| weak project manager; no change control process (change management) | | the effective project management action | inadequate systems engineering | | | | | | 12 | 6 |
| | | | | external monitoring and control | | awareness of and compliance with rules and regulations | | | 6 | 11= |
| | | | | involvement of client are critical for project success | | | client acceptance of the project | | 7 | 10 |
| no stakeholder involvement and/or participation; communication breakdown among stakeholders | | | | | minimization of conflict between stakeholders; balanced adjustment between public and private interests; good communication and information sharing; cooperativeness of stakeholders on a project | effective partnering among project participants | | | 13 | 5 |
| weak commitment of project team; team members lack requisite knowledge and/or skills; subject matter experts are overscheduled; resources assigned to a higher priority project | resource availability | | | project personnel | | | | appropriately skilled people and trained personnel | 15 | 3= |
| | | | | | | | | | 8 | 9 |
| | | | | | | external monitoring and control | | | 6 | 12= |
| | | | immature technology | | | | availability of required technology | understanding of the technology | 10 | 7 |
| R&D spending levels | | the adoption of innovative management approaches | | | | | | | 4 | 13 |