The engagement of the UK construction industry towards achievement of the Sustainable Development Goals

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Abstract

Purpose

The Sustainable Development Goals (SDGs) provide a blueprint for UN member states to achieve prosperity and peace. A resilient construction industry should positively contribute to the achievement of all SDGs. Yet it is currently unclear if the industry helps or hinders SDG achievement. This research aims to explore if the industry is positively engaging with all SDGs.

Design/Methodology/Approach

This research is split into two phases. The first an objectivist Qualitative Content Analysis (QCA) of sustainability reports from the ten leading UK contractors to identify direct and indirect SDG references. The second research phase adopts a subjectivist ontological position consisting of twenty-one semi structured interviews with a range of construction industry project based professionals. Narrative analysis is used to structure the interview questions and analyse the data gained.

Findings

Many SDGs are excluded from sustainability reports, and where discussed, only some are engaged with substantially. The SDG knowledge held by construction professionals is reduced further still, and SDG progress rarely measured. The ambiguity surrounding the SDGs enables discrepancies between reporting and professional perceptions. There is also a lack of regard for fellow contractor collaboration through fear of reduced competitive advantage.

Originality

This paper addresses a gap in literature between contractor SDG knowledge and action. This serves as a platform for future research agendas regarding how the SDGs can be better understood and actioned in a construction management context. For industry, inconsistencies between organisational sustainability reporting and the knowledge and awareness of staff are exposed, due to the lack of collaborative practices currently adopted.

Key Words

Collaboration, Communication, Social Value, Sustainable Development Goals, Sustainability.

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Introduction

The world currently faces numerous urgent problems. These range from climate change, educational inequalities, a lack of clean drinking water, and extreme poverty. Whilst different stakeholders may all argue the importance of different problems, depending upon their geography, resources, experience, and needs, it can be agreed that all problems need addressing. As problems are often competing for priority and focus, some could be relegated in their importance when compared to others, especially those that may be difficult to measure. In an attempt to highlight the importance of the many problems the planet faces, the United Nations (UN) introduced the Sustainable Development Goals (SDGs) (UN, 2020). The adage 'what gets measured gets done' was arguably in mind when the UN created the SDGs. The seventeen SDGs have 159 qualitative targets and 330 indicators that serve as tangible metrics allowing performance to be measured (Hak et al., 2016). Such scales of measurement arguably serve to hold to account and mobilise responsible organisational behaviour (Nunez-Cacho et al., 2018). However, research indicates that global progress towards the achievement of the SDGs by the UN set deadline of 2030 is not on target (Opoku, 2019). Therefore, in order to achieve the SDGs a renewed focus will arguably be required on the collaboration of all industries and organisations.

The construction industry has a major impact upon SDG achievement due to its global economic significance (Gade et al, 2021). Arguably, a resilient international construction industry is one that responds positively to current and future demands whilst effectively engaging with all SDG requirements. However, there exists a gap in current knowledge pertaining to the extent to which the industry engages with the SDGs. With a historic reputation of not being sustainable, and faced with numerous and often competing priorities (Barthorpe, 2010), it is unknown if the actions and strategies of construction contractors are serving to contribute to, or undermine, the achievement of the SDGs. The purpose of this research is to address the gap in contemporary knowledge with regards to construction industry SDG engagement, and reveal if the industry is helping or hindering SDG achievement. This is of international significance. The impact of this will be the effective deployment of resources to ensure the industry is positively, and substantively, contributing to all SDGs. This paper firstly introduces the SDGs before outlining the significance of the construction industry. Research published at the intersection of these two concepts is critically analysed. The methodological position adopted, and research strategy undertaken is then discussed, with the research instruments outlined. Finally, the findings are then presented with key themes identified and summarised. This paper concludes with how the identified research gaps are addressed, the impactful and original contribution the findings make to further research, and how they serve to inform contemporary international construction industry practices.

The Sustainable Development Goals

The Brundtland Report (1987) defines sustainable development as *"development that meets the needs of the present without compromising the ability of future generations to meet their own needs"* (WCED, 1987). The intentional broad nature of the definition was aimed at securing concept adoption across diverse stakeholders (Rees and Wackernagel, 1996). This can arguably be considered a success with the term sustainability entering mainstream business and political discourse (Halkos and Gkampura, 2021).

Launched in 2000 with 2015 target dates the eight Millennium Development Goals (MDGs) were the manifestation of an increased sustainability focussed world and served as a mechanism to mobilise global action (Sachs, 2012). Introduced in 2012 and adopted in 2015 the SDGs built upon and superseded the MDGs in both breadth and depth. The eight MDGs were then replaced with seventeen SDGs, that were in turn driven by 159 qualitative targets and 330 indicators (UN, 2020). These targets and indicators were specifically adopted to serve as tangible metrics to measure performance (Hak et al., 2016). Such tangible metrics strike chords of familiarity of the idiom 'what gets measured gets done' (Nunez-Cacho et al., 2018). The seventeen SDGs can be seen in Table I.

[INSERT 'TABLE I: THE SEVENTEEN SDGs' HERE]

Global performance against the SDGs has been increasingly explored in the literature to date. Such exploration has included studies critical of the approaches adopted to date across the international community in achieving the SDGs and arguing for increased focus on the interlinkages between key actors and sectors, and between low, medium, and high-income countries (Stafford-Smith et al., 2017). Other studies have proposed areas where investment and attention should be focused, to realise SDG achievement and transformations (Sachs et al., 2019). However, such research is largely theoretical and lacks a pragmatic application of the goals. Indeed, this criticism can be applied to much of the published research in regard to the SDGs across the international community. This is echoed in an interdisciplinary systematic literature review of 101 SDG academic papers published between 2015 and 2020 (Mio et al., 2020). The review described the number of papers identified as "sparse" and found that environmental goals are most likely to be focused upon. The findings also revealed that strategies to achieve the goals are considered to a much greater extent than the actual actions required for SDG accomplishment, and that business and government responsibility and action is now needed for substantial SDG progress to be made (Mio et al., 2020).

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One study focusing upon the pragmatic nature of the SDGs, reports that collaboration between public and private sector partners is of paramount importance in SDG achievement (Owusu-Manu et al., 2020). Through an extensive literature review of Ghana's energy sector, followed by purposive interviews with key stakeholders, the study found cooperation and collaboration resulting from PPP's can allow knowledge sharing, and the replication of positive actions and sustainable impacts (Owusu-Manu et al., 2020). The study's parameters were limited to the Ghanian energy sector with respondents drawn predominantly from Government agencies and associated think tanks. Result generalisation is therefore questionable as are the representative nature of the interviews given their arguable one sided perception's. Nevertheless, the pragmatic manner of research collection and application offers a redress to the paucity of pragmatic SDG research.

A more recent development in SDG research has considered the use of Artificial Intelligence (AI) in assisting SDG achievement. This original study argues It has been argued an increase in AI use can lead to both positive and negative outcomes depending upon the SDG indicator selected, serving as either an inhibiter or enabler (Vinuesa et al., 2020). Research also identified mutually beneficial relationships between some SDGs, where success towards one goal positively contributes towards the success of another (Fonseca et al., 2020). However, the same research also identified an adverse relationship in that focus afforded to one SDG could potentially hinder the progress of another (Fonseca et al., 2020). In a recent paper Raiden and King (2022) identify a polarisation of perspectives concerning social value stemming from how the concept is operationalised by different organisations. It can also be argued the SDGs provide a holistic framework within which broader sustainable policy can be better articulated and actioned leading to reduced polarisation of organisational perspectives. It is widely acknowledged that collaboration of both government and industry is required for SDG achievement to be realised. Despite the increasing number of SDG publications, and the small but growing number of pragmatic research undertaken regarding SDG action, relatively few studies have considered the role the construction industry plays in SDG achievement. Yet, due to its size and scale, the actions of the construction industry could make a substantial difference to the achievement of the SDGs (Gade et al., 2021).

The Significance of the Construction Industry

There exists intrinsic links between the SDGs and the construction industry due to the industries size, scale, and operations. For example, the sheer number of people employed highlight its importance in contributing to the success of gender equality (SDG5). Its significant GDP economic contribution

impacts 'Decent Work and Economic Growth' (SDG8). Employment practices within the industry also have a substantial impact on SDG8 with the industry described as the original gig economy (Erlich, 2021). Whilst based in the American construction industry, parallels can be drawn across international workforces, particularly in the Western economies. The research reports on employment shifts over previous decades from full time employed to independent sub-contractors, stripping workers of rights, union membership, and enhancing precarious employment (Erlich, 2021). The manner in which the industry procures raw materials required for consumption is closely linked to SD12 (Responsible Consumption and Production) and any emissions the industry generates (or saves) will impact SD13 (Climate Action). The industry also arguably has more reason than most to work towards the SDGs as it has been reported the industry's focus on time, cost, and quality above all other factors is a major contribution to emissions, and extracts and consumes a high amount of raw materials (Barthorpe, 2010).

Globally, the construction industry significantly contributes to national economies and workforces. In the UK, the industry represents over 6% of the workforce (some two million jobs) and contributes 9% towards the UK economy (over £99bn) annually (Rhodes, 2019). In Nigeria, this figure is closer to 5% (Apata, 2019) as is the construction sector in the USA (Chih and Hsiao, 2023). The size of the construction industry is therefore significant in terms of impact and upon SDG achievement. Such potential impact has not gone unnoticed. A small but increasing amount of research published over recent years is positioned at the intersection of the construction industry and the SDGs. Such research has been explored from numerous perspectives. For example, one study seeks to understand the SDG perceptions of Danish construction industry professionals via a questionnaire. The study found 90% of respondents believed the SDGs added value on a project level, and 79% of respondents had implemented SDG action on an organisational level (Gade et al., 2021). However, a relatively large sample of 54 respondents is drawn from across a diverse range of professionals. Therefore, the results cannot claim to be a representative sample of the industry. Nevertheless, the study attempts to understand the SDGs from a construction industry perspective and serves to inform an area previously underexplored with quantitative insights.

Research has also argued that within the construction industry literature, little attention is paid to SDG areas such as biodiversity, despite the industry having the potential to significantly positively impact this SDG (Opoku, 2019). The research findings were drawn from qualitative focus groups consisting of sixteen experienced professionals. Whilst a rich insight into the knowledge of individuals was gained, the diverse roles of those involved were often represented by only a single

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professional. Further research is therefore needed to enhance the generalisability of such findings. Nevertheless, clear conclusions from the research are drawn. These include the need for greater clarity and focus on sustainability at all political and organisational levels, and a clear link between biodiversity, the SDGs, and the construction industry (Opoku, 2019). Interestingly, the research reinforces existing arguments that the success of one SDG is linked to the success of another (Opoku, 2019). This potentially indicates neglecting to focus on some SDGs could undermine the success of other SDG that are intended to be supported.

Further barriers to a consistent construction industry response also include the differing terminology used preventing the mobilisation of coordinated action (Owusu-Manu et al., 2020). Overcoming such barriers often sits hand in hand with sustainable resilience. Resilience itself is defined as the ability to mitigate the impacts of risks and ensure consistent management of services post risk events (Ayyub, 2014). Where sustainability and resilience overlap they arguably serve to either restrict or reinforce one another (Assad et al., 2021). Risks can include factors preventing SDG achievement, with resilience used to describe a contractor overcoming barriers to effective SDG engagement. A construction industry that is not resilient, will therefore be unable to fully support the success of the SDGs, and an industry that does not positively support the SDGs will not be able to be considered resilient.

Methodology

The SDGs occupy a somewhat unique position in methodological considerations in that as a concept each goal can be described as relativist. Yet each SDG is underpinned by an objectivist approach to measuring success. A relativist position has socially constructed meanings and is agreed upon by relevant actors, and therefore potentially subject to change over time as meanings develop, evolve, and are influenced by other factors (Clark et al., 2021). The benefits of the SDGs adopting a relativist ontological approach are that this allows the social constructs of reality to be acknowledged and ambiguity of the phenomena recognised (Clark et al., 2021). Yet such an approach can serve to limit the measurement ability as accepted indicators may not be agreed upon.

Arguably the UN were aware of the limitations in mobilising collaborative action under subjective targets, such as how the subjective nature of concepts can lead to different levels of engagement from those required to take action (Watts et al, 2019). Therefore, each SDG is underpinned by

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objective key performance indicators. Such an objectivist position stems from the natural sciences and believes such social phenomena exist independent of the social constructs of actors and is underpinned by quantitative research and data collection methods (Robson and McCartan, 2017). However, whilst the indicators themselves can be judged with a degree of objectivism, the approach adopted by those organisations contributing to the SDGs are arguably of a subjective nature.

Two distinct 'research phases' are adopted to address the different SDG ontological perspectives. This is distinctly different to a mixed methods approach as two research instruments are utilised. The results of the objectivist first phase serve to inform the research instrument design of the relativist second research phase.

The objectivist position of the first research phase treats the UNs statement of the SDGs as the singular correct interpretation and adopts a positivistic epistemological stance. This objectifies knowledge and utilises natural science techniques to understand the social nature of reality (Cresswell, 2013). In this phase a review of construction contractor sustainability reports is undertaken. UK main contractors' were ranked by their turnover in the year 2021. Ten out of the top twenty contractors were then selected at random and their websites reviewed with the most recently published annual reports relating to sustainability downloaded. Where reports containing the word 'sustainability' in the title were not found, reports were downloaded that contained terminology such as 'social value' and 'corporate social responsibility' or similar. This was due to sustainability being known under different terms by different stakeholders. Reports were deemed suitable for inclusion if they fulfilled the following three criteria adopted from Thorne et al., (2014). Firstly, they were markedly different from the organisational annual report. Secondly, they contained content that is not deemed as simply mandatory. Thirdly, they had an environmental or social focus (Thorne et al., 2014). A Qualitative Content Analysis (QCA) was then conducted on each report. A QCA, similar to that of a content analysis, allows for text use to be analysed and quantified in a systematic manner enabling pattern identification and result replication (Gray, 2018). This is then built upon with a depth of quantitative understanding by exploring the intention and connotations in the text used (Lock and Seele, 2016). A PDF based search was then conducted with the SDGs serving as the key words. The context around any key word identified was then reviewed and recorded.

The second research phase built upon the quantitative data gained from the QCA but adopted a relativist ontological position. This interpretivist stance allows a deeper understanding of the

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concept to be gained from the perspective of each participant's experiences, with such experiences then serving to inform the socially constructed concept being investigated (Ozuem et al., 2014). Semi-structured interviews were selected allowing for flexibility in relation to areas of emerging interest (Clark et al., 2021). Purposive sampling was utilised to identify participants who could satisfy the research needs (Robson and McCartan, 2017). Participants were selected from the same organisations whose annual sustainability reports were reviewed. A Linked-In search for suitable employees was conducted with those identified separated into three main categories: office based upper management, site-based professionals, and sustainability focused professionals. Forty individuals were contacted for interview participation. Thirty-three positive responses were received, and these resulted in twenty-one interviews. Via an extensive review of fifty four previous studies, Galvin (2015) concluded that eleven to fifteen interviews were optimum for confidence in any findings drawn. As twenty-one interviews were conducted, substantially exceeding the range set by Galvin (2015), it was determined the sample was sufficient from which to draw conclusions. The interviews were conducted via online video conferencing due to time and geographical restrictions. A breakdown of participants can be seen in table II.

[INSERT 'TABLE II: RESEARCH PARTICIPANTS' HERE]

Narrative analysis both structured the interview questions and was used to analyse the interview data. As a method of utilising stories to gain insights into a participant's knowledge and understanding, narrative analysis allows for comparison and trend identification across participants (Sandelowski, 1991). Questions were phrased from the perspective of requests for stories to be told. Participants were asked questions such as 'what do the SDGs mean to you', 'can you provide an example of how your organisation is contributing to achieving an SDG', and 'how do you measure SDG performance'. The results could then be compared and categorised across all participant responses with key elements identified and any patterns and trends revealed.

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Findings and Discussion

Analysis of the results from both research phases revealed the following key themes:

Contractor Awareness of SDGs

It was revealed all construction contractors sustainability reports contained some element of SDG engagement. Each contained a direct mention of between three to seventeen SDGs. Therefore, despite previous studies reporting a 'sparse' amount of SDG research (Mio et al., 2020), construction contractors are broadly aware of SDGs (from a reporting perspective). Table III illustrates the frequency the SDGs are discussed across all ten reports analysed. Each instance of SDG use was recorded as either 'green' (a tangible strategy in place evidenced by practices and or metrics), 'yellow' (a detailed statement or strategy on how the goal would be contributed to, but no metrics in place), or 'red' (no strategy, practices, substantiation of any sort, with either no, or limited, information contained.

[INSERT 'TABLE III: FREQUENCY OF SDGS IN CONTRACTOR REPORTS' HERE]

Analysis of the sustainability reports revealed from 170 opportunities to specifically discuss an SDG (17 SDGs multiplied by 10 contractor reports), there are 111 occasions (65%) where strategies and practices were evidenced to either a green standard (n=88) or n yellow standard (n=23). Overwhelmingly therefore, the SDGs are reported upon by contractors. However, the interviews revealed the majority of participants (n=16) had heard of the SDGs, although some were still not familiar with the term SDG (n=5), but did have broad awareness of sustainability For example, one respondent stated "I've not come across any specific sustainable goals before but I know what sustainability is" (QS1).

The sixteen construction professionals who had heard of the SDGs previously were then asked to name as many SDGs as they could, naming nine between them. This ranged from two goals (QS2), to six (QS3). Figure I illustrates the SDGs construction professionals could name (unshaded), with the shaded SDGs the ones no professional was able to name.

[INSERT 'FIGURE I: THE SDGs UNABLE TO BE NAMED BY PARTICIPANTS (ARE SHADED)' HERE]

However, those construction professionals able to name some SDGs admitted they were not fully confident in the ones named to be correct, and some incorrect attempts were made. For example, 'social value' was believed to be an SDG (DM2), as was "mental health awareness" (CM1). Construction contractors are therefore potentially positively contributing towards the SDGs simply via general responsible behaviour but not with a specific SDG intention in mind. However, the SDGs may also potentially be hijacked by organisations with serving self-interests without being fully understood or committed to resulting in inconsistent staff knowledge and therefore resulting in sporadic and potentially ineffective SDG action. This furthers the conclusion drawn by Raiden and King (2022) that social value (and by extension, similar concepts) can be mobilised by some organisations providing a name to their altruistic actions, yet by others to serve self-interests. This also builds upon findings regarding the ambiguity of sustainability (Watts et al., 2019), in that even with specific goals in place, low awareness besets ambiguity. This in turn allows misunderstandings to become prevalent leading to construction professionals naming vague sustainability concepts and falsely identifying SDGs (Watts et al., 2019). Contractors are reporting engagement at an organisational level, yet general employee awareness appears low. Arguably the intended stakeholders of construction SDG reported action is not the professionals they employ.

SDG Industry Perception

Despite the identified SDG, all interviewees who were familiar with the goals, reported positive perceptions. Those interviewees unfamiliar with the SDGs illustrated a positive perception once the SDGs were explained. For example, QS1 confirmed "They [SDGs] all sound like suitable targets …and it would be great if we could achieve them". The overwhelming consensus was that the SDGs are aiming to do good for the planet and its population. However, whilst all goals were considered important, there was a consensus amongst four of the professionals a hierarchy could be placed upon the goals, encouraging coordinated efforts on each in turn. As PM2 stated "I can see why all [SDGs] are important, but tackling poverty (SDG1) has got to be the first goal that needs to be achieved".

Once the SDGs were explained to those interviewees who reported to have no previous knowledge, several stated that their respective organisations were currently involved with SDG aligned initiatives, but that they were unaware of the connection previously between what they were undertaking and the positive contribution to the SDGs. For example, QS3 outlined an organisational policy that provided training and qualifications for homeless people, they hadn't previously realised this contributed to SDG4 (Quality Education).

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Other interviewees did state the connection between their organisations CSR, SV, and Social Sustainability practices and the SDGs, but claimed these links were implicit and the use of the term SDG was never discussed. All participants, however, were fully supportive of all SDG targets set. Therefore, although SDG awareness was relatively low amongst construction professionals interviewed, the concept was familiar and the perceptions positive. This potentially bodes well for future SDG focused initiatives in the construction industry as professionals believed in their purpose and are already positively contributing to similar concepts. Yet, the lack of direct knowledge could be considered alarming for an industry that potentially has such a large impact on SDG achievement.

The Construction Industry's contribution to achieving SDGs

Despite the positive perceptions of the SDGs, the consensus of those interviewed was the industry could do more in way of SDG support. The interviewees broadly agreed the SDGs most frequently mentioned by their organisations are Gender Equality (SDG 5), Decent Work and Economic Growth (SDG 8), Industry Innovation and Infrastructure (SDG 9), Reduced Inequalities (SDG 10), Sustainable Cities and Communities (SDG 11), and Responsible Consumption and Production (SDG 12). Interviewees reported low awareness of the remaining SDGs, believing their respective contactors had minimal positive impact against the goals. This potentially provides support for existing research which reports low levels of SDG education leads to low levels of SDG action and achievement (Ferrer-Estevez and Chalmeta, 2021). Although it is unclear if the SDG action and achievement is low due to low awareness or if the actions are successful but there is low awareness of such success.

Interestingly, out of the six SDGs the interviewees felt their organisations were positively contributing to (SDG5,8,9,10,11,12) only four of these had significant discussion in the sustainability reports reviewed as part of the QCA. With SDGs 9 (Industry, Innovation, and Infrastructure) and 10 (Reduce Inequalities) mostly 'red' in the QCA analysis in table III (in that they are not directly or indirectly discussed). This reveals that contractors are potentially more advanced in SDG action than communication. However, it could also reveal further confusion and ambiguity surrounding the SDGs impacts the perceptions of professionals in that they believe they are positively contributing to SDGs that they are not.

All interviewees also reported their respective contractors did have many strategies and policies relating to CSR, SV, and Social Sustainability, but these did not specifically mention any SDG in internal communications. Interestingly, it appears contractors are positively contributing to some

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SDGs but fail to promote such achievements to staff. Therefore, despite the positive perception of the SDGs amongst the construction professionals interviewed, the low levels of awareness of some SDGs and failure to communicate SDG progress generally may hinder broad SDG adoption and restrict positive SDG contribution within the construction industry. Staff, it appears, are undervalued stakeholders when it comes to contractor SDG engagement. This finding is of novel significance in SDG and construction industry literature as it exposes a further research gap in how SDGs may be more ethically engaged with.

What gets measured gets done

If the idiom 'what gets measured gets done' (Nunez-Cacho et al., 2018) is to be believed, then the strategies and practices for each SDG need to be of a quantitative nature. This was reinforced in research by Hak et al (2016) who argued the quantitative design of the SDGs was intentional to ensure tangible metrics were in place to monitor and record progress made. The QCA revealed that out of seventeen goals from across ten reports (170 opportunities for a specific SDG to be addressed), the contractors specifically addressed an SDG green on eighty eight occasions (51%). There are 23 occasions only broad information is communicated (14%) and 59 occasions no information pertaining to the SDGs is communicated (35%).

During the interviews when the topic of SDG measurement was brought up, from those sixteen participants who had heard of the SDGs, all discussed a technique, method, or organisational practice that had been implemented as some form of SDG measurement. However, such measurement practices were only pertaining to SDG 8 (Decent Work and Economic Growth) and SDG12 (Responsible Consumption and Production). For example, carbon reduction calculators (PM2) were discussed, and recycled waste targets mentioned (QS5). The interviewees aware of SDGs were unaware of any practices in place to measure any others. On the 49% of occasions there are no specific metrics provided, if the idiom of 'what gets measured gets done' is true, no progress is being made towards achieving the SDG in that instance.

A failure to consider wider collaboration

This study also found only a single mention for SDG 17 (Partnership for the Goals) in the sustainability reports and not at all during the interviews. This is despite collaboration being described as is key to the achievement of the SDGs (Halkos and Gkampoura, 2021). Furthermore, the single mention of SDG17 was via a graphic of all SDGs with no elaboration or substantiation. No

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report discussed wider collaboration to achieve the goals. Indeed, all ten contractors were rated 'red' against SDG17.

When collaboration was discussed in the interviews, all examples provided pertained to supply chain engagement and working with clients. Both up and down the supply chain. No collaboration was reported with any fellow contractors due to the potential nature of their relationship, with one interviewee stating 'I wouldn't want any other contractor finding out what we've done until after we'd done it" (COM2). It appears each contractor is willing to make efforts to contribute individually to the SDGs, but collaboration with fellow contractors is hindered by the desire to retain competitive advantage, even if this ultimately restricts the amount of progress made towards achieving the SDGs as an industry. As collaboration arguably underpins the success of every SDG, a lack of collaboration potentially undermines SDG achievement. This is significant given the international urgency and importance of the SDGs.

Areas with greatest, and with lack of, focus

Analysis also reveals that SDG11 (Sustainable Cities and Communities) is the most cited being discussed in nine out of the ten reports reviewed. However, the SDGs with the most categorised as green across all ten reports are SDG5 (Gender Equality) and SDG10 (Reduce Inequalities). Arguably therefore, action is being taken to address some of the biggest contemporary challenges faced. However, the SDGs that contained all red statements from across reports, and were not directly mentioned (excluding the report mentioning all SDGs but with no substantiation for many) were SDG2 (Zero Hunger), SDG14 (Life Below Water), and SDG17 (Partnerships for the Goals). This aligned with the interviews as all were SDGs the interview participants could not name. Therefore this research reveals that consistent gaps exist in contractor SDG awareness. Such gaps will need to be addressed by future industry action should the construction industry want to make positive contributions to all SDGs across both contractor reporting and professional knowledge exist.

The Model of SDG engagement

Analysis of both research phases identified that SDG knowledge, awareness, and engagement across contractors can be categorised into four levels. The first lists all SDGs and represents what the contractors should ideally be aware of. The second tier are those SDGs that are only reported on. The third those that are substantially engaged with, and the fourth those that construction professionals have a detailed knowledge of. This is illustrated in figure II and reveals the contractors to have a broad knowledge of the UN SDGs and are aware of the majority. Yet are only substantially

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contributing to a few. The industry is also seemingly deciding to ignore some SDGs in their entirety. With 14ctionns taken to address these SDGs, this inaction Is potentially serving to hinder the positive achievement of all SDGs. Arguably a resilient construction industry is one which can support both the current and future needs of all SDGs and not just a select few. The intention of figure II should be to structure the model, with relatively few, if any, SDGs at level I, and all SDGs listed at level 4. This should be the focus of both future research and industry action, attempting to ensure as many SDGs are substantially engaged with as possible.

[INSERT 'FIGURE II: THE MODEL OF SDG ENGAGEMENT' HERE]

Conclusion

The aim of this research is to understand if the construction industry is positively engaging with all SDGs. This sought to address a gap in contemporary literature pertaining to SDG perception, awareness, and engagement by construction contractors. This research is therefore of significance due to the international importance of the SDGs and its attempts to broaden the understanding of contractor awareness and action. The rigorous two phase research undertaken revealed several original insights.

Firstly, there appears a disconnect between the SDG actions communicated via contractor annual reports and the knowledge of construction contractor professionals. Whilst all contractors are aware of the SDGs from an organisational perspective, it appears this organisational mobilisation of the concept often does not filter down to the professionals they employ. However, the research did reveal that despite inconsistent SDG knowledge, all construction professionals were highly motivated to achieve sustainable targets, and were often working towards targets that they, and in some cases, their organisation, had not linked to any particular SDG despite the clear overlap. Whilst this lack of direct knowledge could be alarming given the prevalence with which the SDGs are discussed in organisational reports, it is promising to see that some activity to positively contribute towards SDG achievement is undertaken. Nevertheless, low levels of SDG awareness are linked to low levels of SDG action. Therefore, the positive SDG actions construction professionals are undertaking are limited and minimal compared to the positive actions that could be undertaken given broader construction professional awareness. This is largely down to contractor actions as external communication documents are littered with SDG references, yet internal communications

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were reported to be sparse, further contributing to the lack of SDG awareness reported by construction professionals.

Overall, construction reports do substantially engage with the SDGs. Whilst substantive engagement is not evidenced for some goals, there is still often a basic level of acknowledgement regarding the majority of SDGs. However, for almost half of all SDGs there is no clear tangible plan or target reported on. If it is true, and 'what gets measured gets done', then almost half of all SDGs are not receiving any significant positive contribution from construction contractors. The most overlooked SDG was SDG17 (Partnership for the Goals). All contractors reported a willingness to collaborate 'up' the supply chain with clients, and 'down' the supply chain with sub-contractors, but all were reluctant to collaborate with fellow main construction contractors for fear of commercial advantage loss. As collaboration arguably underpins the success of the SDGs, a failure to collaborate serves to undermine any success and restricts what can be achieved. This is a previously underexplored phenomena in international SDG research, and one which needs to be addressed to understand the full ramifications a lack of true collaboration results in. A model of SDG engagement is proposed which illustrates how SDG knowledge, awareness, and engagement can be categorised. The four levels of this model extend beyond the parameters of this research, and serve to illustrate how SDG knowledge may be broad, but only a select few SDGs have a greater level of awareness, and then only fewer still are substantively engaged with and positive contributions measured and evidenced. The model developed in this research can be used on broader organisations to understand and identify which SDGs are being substantively engaged with and which are only being engaged with superficially. Due to the international significance of the SDGs, this model of SDG engagement is also applicable internationally and can provide a consistent model by which to measure organisational SDG performance and commitment.

These findings are of significance for the construction industry in that a greater SDG awareness is needed by professionals in order for the SDGs to be more substantively engaged with. Whilst some good SDG progress is being made, this is limited and broader collaboration is required with fellow contractors to help support SDG achievement. In order to ensure all SDGs are substanivley engaged with, all contractors should set tangible targets for each of the SDGs. A focus should also be placed upon internal communication and awareness of SDGs to address the undervaluing of internal stakeholders often evident in the industry. This may then serve to remove internal barriers to SDG engagement and contribution. Further research should be positioned around removing the barriers

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to SDG collaboration and verifying and validating the use of the SDG engagement model against broader organisations, both inside and outside of the international construction industry.

The originality of this paper, and its contribution to knowledge include its identification of the confusion over the SDGs in the construction industry, and the impacts this confusion has; from potentially purposeful misreporting of positive SDG progress, to accidently excluding practices that do positively progress SDG achievement. The paper also highlights the lack of collaboration in achieving the SDGs, introduces the model of SDG engagement, and addresses an identified research gap in understanding which SDGs the industry is positively engaging with, which SDGs it is not, and how this potentially hinders overall SDG achievement. These findings identify a novel and previously underexplored research gap. This gap potentially holds the answer to how and why SDGs engagement can be successfully realised by construction contractors.

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Table I: The Seventeen SDGs (table by author)

‘1. No Poverty	‘2. Zero Hunger	‘3. Good Health and Wellbeing
‘4. Quality Education	‘5. Gender Equality	‘6. Clean Water and Sanitation
‘7. Affordable and Clean Energy	‘8. Decent Work and Economic Growth	‘9. Industry Innovation and Infrastructure
’10. Reduced Inequalities	’11. Sustainable Cities and Communities	’12. Responsible Consumption and Production
’13. Climate Action	’14. Life Below Water	’15. Life on Land
’16. Peace, Justice, and Strong Institutions	’17. Partnerships for the Goals	

Table II: Research Participants (table by author)

Participant Job Role	Participant Code	Industry Experience (Years)	Organisation
Building Surveyor	BS1	10	Contractor A
Building Surveyor	BS2	18	Contractor I
Building Surveyor	BS3	12	Contractor J
Construction Manager	CM1	35	Contractor A
Construction Manager	CM2	4	Contractor B
Construction Manager	CM3	11	Contractor D
Project Manager	PM1	7	Contractor C
Project Manager	PM2	16	Contractor B
Project Manager	PM3	9	Contractor D
Project Manager	PM4	19	Contractor E
Quantity Surveyor	QS1	5	Contractor C
Quantity Surveyor	QS2	5	Contractor F
Quantity Surveyor	QS3	7	Contractor G
Quantity Surveyor	QS4	2	Contractor J
Quantity Surveyor	QS5	15	Contractor A
Quantity Surveyor	QS6	21	Contractor I
Design Manager	DM1	7	Contractor H
Design Manager	DM2	11	Contractor J
Community Manager	COM1	3	Contractor C
Community Manager	COM2	3	Contractor D
Community Manager	COM3	8	Contractor I

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Table III: Frequency of SDGs In Contractor Reports (table by author)

			SDGs																
Contractor	Year of publication	Publication Details	1 No Poverty	2 Zero Hunger	3 Good Health and Wellbeing	4 Quality Education	5 Gender Equality	6 Clean Water and Sanitation	7 Affordable and Clean Energy	8 Decent Work and Economic Growth	9 Industry, Innovation and Infrastructure	10 Reduce Inequalities	11 Sustainable Cities and Communities	12 Responsible Consumption and Production	13 Climate Action	14 Life Below Water	15 Life on Land	16 Peace, Justice and Strong Institutions	17 Partnerships for the Goals
A	2021	Stand alone annual sustainability report																	
B	2021	Combined Annual Report																	
C	2021	Stand alone Social Value report																	
D	2020	Combined Annual Report																	
E	2020	Environmental, Social and Governance report																	
F	2020	Stand alone Social Value report																	
G	2020	Environmental, Social and Governance report																	
H	2021	Annual sustainability report																	
I	2020	Annual Social Value report																	
J	2020	Stand alone annual sustainability report																	

Key		
A tangible strategy in place evidenced by practice and or metrics	A detailed statement or strategy on how the goal would be contributed to, but no metrics in place	No strategy, practices, substantiation of any sort with no or limited information

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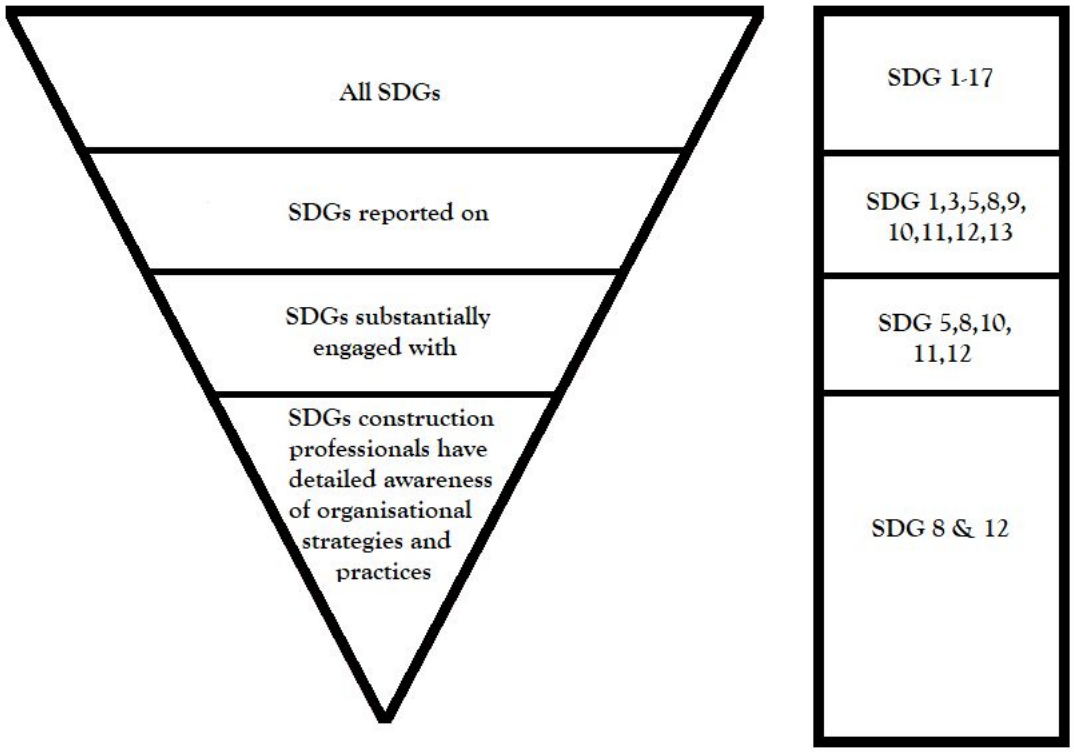
Figure I: The SDGs unable to be named by participants (are shaded) (figure by author)

‘1. No Poverty	‘2. Zero Hunger	‘3. Good Health and Wellbeing
‘4. Quality Education	‘5. Gender Equality	‘6. Clean Water and Sanitation
‘7. Affordable and Clean Energy	‘8. Decent Work and Economic Growth	‘9. Industry Innovation and Infrastructure
’10. Reduced Inequalities	’11. Sustainable Cities and Communities	’12. Responsible Consumption and Production
’13. Climate Action	’14. Life Below Water	’15. Life on Land
’16. Peace, Justice, and Strong Institutions	’17. Partnerships for the Goals	

Figure II: The Model of SDG Engagement (figure by author)



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