



Systematic Review Exploring Leadership Styles to Foster Sustainability in Construction Projects: A Systematic Literature Review

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Abstract: Background: The construction sector has faced significant challenges in addressing the world's pressing crises, such as climate change, poverty, and human well-being. Ensuring sustainability in construction projects is pivotal, and leadership plays a crucial role in embedding sustainable practices. Objectives: This research aims to identify an effective leadership style for implementing sustainable practices in construction projects through a systematic literature review (SLR). Methods: A comprehensive SLR was conducted, focusing on leadership in sustainable construction. The review process included identifying, screening, and analysing relevant literature. Thirty-one articles were meticulously selected and evaluated to understand the relationship between leadership styles and sustainable practices in construction. Results: The findings suggest that no single leadership style is universally applicable in all contexts within sustainable construction. However, transformational leadership stands out for its benefits in facilitating sustainable practices. The review provides insights into various leadership approaches and their effectiveness in different scenarios. Conclusions: The study concludes that while a universal leadership style for sustainable construction does not exist, transformational leadership is generally more effective. This finding is significant for construction project managers aiming to implement sustainable practices, providing them guidance on the leadership styles that are most likely to yield successful outcomes in their projects.

Keywords: construction; leadership; sustainability; net-zero

1. Introduction

The construction industry is one of the most significant contributors to the global economy, accounting for 13% of the global GDP. The number of construction projects has skyrocketed globally due to an increase in population, migration from rural to urban areas, and the consequent increase in urban density [1]. With the exponential increase in the number of construction projects, the sector also encounters several challenges, such as scarcity in resources, overwhelming levels of risks, challenges in logistics, delays in project delivery, cost and schedule overruns [2], and several contractual disputes [3]. To address these challenges, scholars have been making continuous efforts to develop comprehensive and consolidated project success factors that incorporate the advent of digital technologies [4-8]. The construction sector has contributed significantly to globalisation, urbanisation, and industrialisation. While positively contributing to the socio-economic growth of countries, the construction industry is also responsible for huge environmental degradation [9] and resource depletion [10], consuming tremendous amounts of energy, water, and raw materials [10,11]. It is estimated that construction processes and activities are responsible for 32% of the global consumption of natural resources [12,13] and 50% of the total raw materials [14]. Furthermore, construction projects generate 19% of greenhouse gases, 37% of the world's carbon emissions, and 30–40% of solid waste, accounting for approximately 924 million tons of waste materials [14,15]. The alarming evidence of damage to the environment and other natural resources is attributed to the construction industry's 'take-make-dispose' approach (the linear model) [16], in which resources are used



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Copyright: © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (https:// creativecommons.org/licenses/by/ 4.0/). in construction, and waste is discarded, without consideration for potential reuse and recycling [17]. Consequently, the concept of 'circular economy' (the cradle-to-cradle approach) has attracted substantial attention in recent years [18]. For construction projects to respond to global challenges, they must adopt sustainability practices in their process [19]. The construction industry must embrace sustainable practices throughout the project lifecycle, spanning designing, planning, and developing [20]. Sustainable construction ensures the delivery of environmental, social, and economic sustainability in a balanced and optimal manner, without one pillar dominating the others [21].

Construction is not exempt from the changing global priorities. An urgent call has been made in the 2030 Agenda for Sustainable Development for all states and organisations to meet the 17 sustainable development goals (SDGs) in order to protect the world, bring prosperity, and combat climate change [22]. To limit the impacts of greenhouse gas emissions, many countries are committing to net-zero emissions by 2025 [23]. Net zero refers to "reducing the greenhouse gas emissions to as close to zero as possible, with any remaining emissions re-absorbed from the atmosphere, by oceans and forests, for instance" [23]. To reach this significant milestone, it is necessary for both individuals and organisations to revolutionise methods of production, consumption, and waste management. The building and construction sector should be decarbonised by 2050—a target set in place at the Conference for Parties (COP26), known as the Paris Agreement [24]. To meet the target and combat environmental damage, the focus of construction projects is required to shift to sustainability in both product- and process-oriented activities.

In any organisation, leaders play an influential role in innovating and meeting the demands of a dynamic business environment [25]. In the resource-based theory of the firm, leadership is a valuable resource for an organisation [26]. Effective leadership is required for the smooth functioning and development of organisations, as well as for motivating employees and establishing strategic missions and visions [27]. The traditional leadership theory from the 1970s focused primarily on value in economic terms [28]. However, in the 21st century, when sustainability is the focal point and bedrock of construction project practices driven by the need to achieve net zero by 2050, set out in the Paris Agreement, traditional leadership theories are ineffective. The sustainable leadership theory has gained increased attention and significance due to the repercussions of the economic crisis. In their definition, Avery and Bergsteiner [29] emphasised that "Sustainable Leadership requires taking a long-term perspective in making decisions; fostering systematic innovation aimed at increasing customer value; developing a skilled, loyal and highly engaged workforce; and offering quality products, services and solutions" (p. 5). The concept of sustainable leadership has been applied across diverse settings and environments. Scholars like Hargreaves and Fink [30], Davies [31], and Lambert [32] have examined sustainable leadership within the educational sector, conducting organisational-level analyses in both the USA and the UK. Avery and Bergsteiner [29] have taken an organisational approach in various contexts. In contrast, [33] have centred their focus on the cultivation of sustainable leaders from an individual standpoint. However, Avery and Bergsteiner (2011, p. 5) highlighted that "there is no one 'right' way within the overall sustainable leadership paradigm". Ref. [34] suggests that despite having many frameworks for sustainable leadership, context must play a pivotal role in how an organisation can operationalize the concept.

Project managers play a critical role in transforming and influencing project team members to achieve sustainable performance [35]. Therefore, contemporary project managers need to adopt a leadership style that can strike a balance among the three pillars of sustainable development (environmental, social, and economic goals) [36]. They can promote sustainability aspects in projects, improve productivity [35,37], and enhance decision-making [38] using appropriate leadership styles.

While the leadership style of project managers has a profound impact on achieving sustainability goals in construction projects, there is a lack of research on leadership in sustainable construction projects [35]. What leadership style is most suitable for integrating and assimilating sustainable practices in construction projects to achieve sustainable

development goals? This requires investigation. The existing literature on the leadership styles required for construction projects, as well as how different leadership styles can contribute to achieving critical targets and addressing pressing challenges, lacks a solid foundation. There are some systematic literature reviews, such as [39], that explore project managers' leadership competencies [39], although the review was not primarily based on the construction sector. In addition, the review did not consider sustainability. Piwowar-Sulej and Iqbal [36] addressed the relationship between leadership styles and sustainable performance through a systematic literature review, but not in the context of the construction sector. Kiani Mavi, Gengatharen [40] provide an overview of sustainability in construction projects, but with no particular attention being paid to specific leadership styles and leaders' competencies related to sustainable construction practices. Although Zulkiffli and Latiffi [41] conducted a systematic review on the leadership styles of project managers, the research was focused on the pre-construction phase of sustainable construction projects. The leadership styles they identified included skills in communication, motivation, decision-making, and problem-solving; conflict management; delegation; planning and goal-setting; team-building; and negotiation. In other words, it was generic. This review was also limited to the pre-construction phase of sustainable construction projects. Refs. [42–44] conducted systematic literature reviews on leadership in corporate social responsibility (CSR), environmental, social, and governance (ESG) reporting. These reviews discussed leadership in general without focusing on the construction sector. A scoping review on appropriate leadership styles suggests that some researchers have explored various aspects of leadership in sustainable construction projects [45-47].

The overview reported in the preceding paragraphs suggests that research on the leadership styles required for promoting sustainability practices in construction projects for achieving the SDGs and the net-zero mission is inadequate. However, there exists little in the way of a comprehensive literature review considering existing empirical research on leadership styles in construction projects to aid in the achievement of UN's SDGs. There is also a dearth of research that systematically analyses the existing literature and proposes a future research agenda on leadership styles for sustainable construction. Therefore, this research aims to bridge the gap by exploring the appropriate leadership styles to accelerate the achievement of the SDGs in sustainable construction projects, utilising a systematic literature review based on empirical peer-reviewed articles. Underpinning this aim, the following research objectives (ROs) will be addressed in this review:

- RO1. To analyse existing publications on leadership styles in construction projects, advancing the United Nation's SDGs, and provide an account of the bibliometric information in the selected articles.
- RO2. To present a view on the state-of-the-art in the field of appropriate leadership styles in sustainable construction projects.
- RO3. To identify knowledge gaps and provide direction for future research agendas on leadership in sustainable construction projects.

This systematic literature review fills the gap between effective leadership styles and achieving sustainability practices in construction projects. The findings of this research will help construction project leaders use appropriate leadership practices to achieve sustainable construction by addressing triple bottom line (economic, social, and environmental) and net-zero targets by 2050. The paper is organised as follows: The research method, consisting of the steps in the systematic literature review (SLR) based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach (Table S2), is discussed in the following section. The results, including bibliometric and content analysis, are presented subsequently. In the following section, the results are examined. Finally, the paper concludes with a discussion of both practical and theoretical implications as well as the limitations of the exercise.

2. Literature Review

2.1. Leadership Competencies

A great emphasis is placed on leadership in the 21st century [48]. Leadership is defined as the process of influencing an organisation's mission and vision by establishing a healthy relationship between leaders and followers [49]. "Leadership is any behaviour that has the effect of helping groups of people achieve something that the majority of them are pleased with and which we assess as significant and what they would not have otherwise achieved" [50]. It involves going beyond individualistic short-term goals and achieving long-term goals for the entire group [51]. There is no ultimate leadership style [52], as it varies depending on the situation and traits [48]. Leadership is one of the critical factors for achieving success in business [53,54].

Leadership competencies have gained popularity in both academia and industry [55]. Due to the transformation to Industry 4.0 and the growing digitization of the economy, leadership competencies suitable for the past industrial era are no longer appropriate [56]. There is a consensus among researchers that a new set of leadership competencies is required in order to respond to the challenges of the 21st century [57]. Ahmed and Philbin [39] conducted a systematic literature review on leadership competencies, based on 60 studies, and clustered project managers' competencies into five groups, including emotional competencies, intellectual competencies, managerial competencies, administrative competencies, and interpersonal competencies. Van Laar, Van Deursen [58] identified seven core leadership skills, along with digital skills, such as communication, problem-solving, critical thinking, information management, creativity, and collaboration. Similarly, for the twenty-first century, Voogt and Roblin [59] suggested seven leadership skills, including problem-solving, social and cultural competencies, communication, critical thinking, collaboration, and information communication technologies. In another review study by Chow, Salleh [60] nine different kinds of competencies were found, such as adaptability, visionary, change, strategic thinking, corporate leadership, agility, and generating funds. Ngayo Fotso [57] accumulated the competencies from the emerging leadership literature. Those competencies are adaptability and flexibility, values, cognitive skills, transformational ability, self-awareness, social skills, communication skills, human orientation, organisational skills, ability to handle complexity, knowledge, global leadership, collaboration and participative leadership styles, customer-centric skills, digital competence, competence for financialisation, sustainability competence, and crisis management competence [57].

2.2. Leadership for Sustainable Development

Sustainability leaders have achieved growing interest in recent years [61]. Leadership for sustainability goes beyond traditional leadership. Sustainability leaders aim to make a sustainable difference in the organisation, community, and broader society. Leaders with a sustainability mindset make decisions to foster outcomes which are aligned with sustainable social, environmental, and economic outcomes [62]. Sustainable leaders focus on long-term sustainability [29]. The aim of sustainability leadership is to create long-term value for all stakeholders, which is not limited to social and environmental benefits [63]. Sustainable leaders work collaboratively with stakeholders in order to implement environmental, social, and ethical practices into the core strategies of business [64]. Sustainable leaders do not only focus on the success, which includes profit generation, commitment, and employee productivity, but also include broader economic, social, and environmental dimensions, namely "triple bottom line", into project goals [65].

The competencies of leaders for sustainable development have received enormous attention, with researchers constantly focusing on training managers to be more sustainable [66]. Willard, Wiedmeyer [67] identified competencies for sustainability, including communication with stakeholders, inspiring and motivating others, strategic planning, problem-solving, project management, and knowledge related to sustainability. Twenty key competencies were identified by [68], most of which are linked to the cognitive abilities of leaders, such as balancing local and global perspectives and system thinking. In order

to navigate through the challenges and wicked problems of the 21st century, leaders need to demonstrate emotional intelligence to maintain a balance between environmental and organisational needs [69]. Raelin [70] suggests that while traditional leadership encompasses relational and practice-based terms, sustainable leadership challenges the traditional 'heroic' views and promotes the concept of 'collaborative agency'. Eight key competencies include interdisciplinary work and learning; solidarity; planning and implementation; foresight thinking; transcultural understanding and cooperation; empathy; compassion; self-motivation; and motivating others.

3. Research Method

There are several approaches to literature review available in social sciences research, such as narrative, scoping, and systematic review [36]. The systematic literature review (SLR) is the most widely used research method when it comes to conducting both bibliometric analysis of the relevant literature, understanding a phenomenon, and proposing avenues for future research [71,72]. However, other types of review are employed in construction engineering and management (CEM) research. An SLR was adopted to explore the status quo of leadership practices in sustainable construction projects. An SLR is a method of identifying, collecting, and analysing retrieved articles on a given topic by using a systematic and transparent method to produce the results [73]. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was employed to identify and retrieve relevant studies on leadership styles in sustainable construction projects [74]. Figure 1 shows the PRISMA data collection strategy for this research.



Figure 1. PRISMA flowchart used in this research.

The literature search on Scopus was conducted in May 2023. In the first stage, identification, Scopus was used as the preferred search engine for searching relevant articles, as Scopus has been recognised as one of the largest transdisciplinary search engines, publishing articles on construction, built environment, risk management, finance, and economics [75,76]. Scopus is considered the better search engine compared to Web of Science, PubMed, and Google Scholar [76]. Scopus covers more publications in business and management, which reduces the possibility of missing articles for this review (Baier-Fuentes et al., 2019). Previous systematic literature reviews have utilised Scopus as one of the leading databases for researching sustainability and leadership [36,77,78]. The following search string was used for searching relevant studies on leadership styles in sustainable construction projects:

(TITLE-ABS-KEY (sustainability OR sustainable OR net-zero OR esg OR "environmental awareness" OR tbl OR "triple bottom line" OR environmental) AND TITLE-ABS-KEY (leadership OR "management style" OR managerial OR "sustainable practices" OR "sustainability leadership" OR "leadership competencies") AND TITLE-ABS-KEY (construction OR infrastructure OR "green building" OR "green construction" OR "sustainable construction" OR "built environment")).

The initial search using the above-mentioned search string resulted in 4238 documents in Scopus. The results were limited to peer-reviewed journals and articles that were written in English. The publication year was kept unrestricted to capture all relevant articles on leadership in sustainable construction projects. This step resulted in 1855 articles.

The second stage involved the screening of the 1855 articles. The titles and abstracts of the articles were screened to identify those articles that were relevant. A large number of articles were removed at this stage because of their irrelevance to the research aim. Their primary focus was not leadership in the context of sustainable construction projects. In most of the cases, leadership was discussed in the context of construction or infrastructure projects without any discussion around sustainability initiatives. Similarly, some research discussed sustainable construction without much focus on leadership. As this research aims to identify leadership styles, studies that did not focus on leadership as the foundation of the papers were excluded. This process led to 72 relevant articles. The eligibility of these 72 articles was checked by reading the full text in the third stage. Thirty-one articles were considered relevant after reading the full text of the article. During this stage, most of the studies were excluded, as they were deemed irrelevant to the aim of the research. Some of the reasons included focusing on the correlation between sustainability practices and performance improvement, barriers to sustainable construction in specific country contexts, project managers' strategies in green construction, effects of knowledge sharing, and the like. In those instances, leadership was not the prime focus of the study, leading to 31 articles for final analysis. Finally, 31 articles were included for bibliometric and content analysis to explore leadership styles in sustainable construction project practices. The final list of the articles was assessed by both authors to ensure that they are valid for inclusion in this review. Reviewing 31 articles was considered adequate, as previous studies in construction management used fewer articles for their systematic review, including 16 articles [79], 17 articles [80], and 23 articles [72].

The selected 31 articles (as listed Table S1) were analysed for both bibliometric and content analysis. The bibliometric analysis offered an understanding of the characteristics of the scientific structure of the research field [81]. The bibliometric information from the reviewed articles was entered into an MS Excel spreadsheet. Several figures were developed using the bibliometric information on the identified articles in relation to the leadership styles in construction projects. In addition to the bibliometric analysis, a content analysis was performed to provide an in-depth analysis of the actual content of the reviewed articles. Content analysis is referred to as a 'systematic, rigorous approach to analysing documents obtained or generated in the course of research' [82]. For investigating the leadership styles required for adopting sustainability in construction projects, a qualitative content analysis was performed. The process entailed reading relevant sections of the texts of the

reviewed articles to address their research objectives. A similar approach was adopted in previous studies on sustainability assessment of construction practices [21]. Qualitative content analysis refers to "systematic, i.e., theory- and rulebound, textual understanding and textual interpretation" [83]. The authors read the articles systematically and analysed them to explore the leadership styles perceived as required for maintaining sustainability in construction projects. The prospects of future research avenues indicated were also noted. An inductive qualitative content analysis was utilised to analyse the content of the reviewed articles, where no *a priori* themes or categories had been established. During the induction qualitative content analysis, relevant texts, words, and statements were coded and grouped into various categories required to address the research objectives.

Assessment of the Contribution of Authors

To adopt sustainability practices in construction projects, appropriate leadership styles are significant. Without practising appropriate leadership styles, sustainable development goals cannot be achieved in construction projects. Therefore, it is critical to know the contribution of the productive authors, institutions, and countries researching this area. To quantitatively measure the contribution of researchers and institutions, the meta-analysis technique of Howard, Cole [84] was adopted. The formula to provide contribution scores to instructions and researchers based on Howard, Cole [84] is presented below:

$$\text{Score} = \frac{1.5^{n-i}}{\sum_{i=1}^{n} 1.5^{i-1}}$$

In the formula above, *n* refers to the number of authors, and *I* demonstrates the rank of the author in each article. According to the formula, the author(s) of each article gets a maximum of 1.0 in total. This 1.0 is distributed across all the authors on that paper. The formula suggests that the lead/first author gets the highest scores, and the other authors share the scores among themselves. Table 1 shows the score matrix of the authors researching leadership in construction projects to adopt sustainability practices.

		Seque	nce of Autho	orship in an	Article	
No. of Authors	1	2	3	4	5	6
1	1					
2	0.6	0.4				
3	0.47	0.32	0.21			
4	0.42	0.28	0.18	0.12		
5	0.38	0.26	0.17	0.11	0.08	

 Table 1. Assessment matrix of the contributing authors.

4. Results

The results section presents the bibliometric and content analysis of the thirty-one articles derived from the systematic literature review on leadership styles in construction projects.

4.1. Bibliometric Analysis

This section outlines the bibliometric analysis of the reviewed articles on leadership in sustainable construction projects. Yearly publication trends, the prominent publishers of the reviewed articles, a citation analysis of the reviewed articles, prominent research methods, as well as the leading countries, institutions, and authors are presented.

4.1.1. Years of Publications for Reviewed Articles

This section presents an account of the number of publications on leadership in sustainable construction projects over the years. This analysis demonstrates annual publication trends. The number of reviewed articles published per year is presented in Figure 2. As shown in the figure, no relevant article was found before 2010. The first relevant article was found in 2010, and a steady rate of publications was maintained up until 2014. There was a fluctuation in the number of publications between 2014 and 2021. A significant spike in the number of publications was evident in 2022, rising from only one article in 2021 to nine articles in 2022. The increasing interest in this area may be because of the discussion around climate change and environmental impacts at the Conference of the Parties (COP26), where 120 nations agreed to achieve a decline in the global average temperature of up to 1.5 degrees by decarbonising economies and organisations. The Paris Agreement not only made world leaders aware of climate change but also attracted researchers' attention. The analysis shows that the identification of leadership styles in sustainable construction projects is an emerging research area, offering future researchers promising opportunities. Publications on appropriate leadership styles for promoting sustainability in construction projects are expected to continue increasing as businesses shift their focus from merely making profits to promoting economic, social, and environmental value as a triple bottom line (TBL). As evident in the literature, the leaders of organisations play an instrumental role in achieving successful business outcomes and promoting sustainability for a better world. Therefore, this research area is expected to grow in the coming years.



Figure 2. Annual publication trends of the reviewed articles.

4.1.2. Publishers of Reviewed Articles

Sustainability, being a hot topic of discussion in the construction industry, has attracted the attention of a wide range of journals. The reason for conducting this analysis is to locate the key repository of research on leadership styles in sustainable construction projects. The identification of influential publishers can be indicative of future researchers' contributions to this growing research area. The reviewed thirty-one articles were published in twentythree different journals, with 16% of the articles published in the journal Sustainability. Table 2 shows the number of articles published by 23 different journals with their impact factors. The impact factor (IF) is an important element to demonstrate the significance of a journal. It is calculated by the number of times selected articles are cited within a particular year. The impact factors of all the journals are more than 1, except for Structural Survey. While Sustainability published the maximum number of articles (five), Built Environment Project and Asset Management, International Journal of Construction Management, Engineering, Construction and Architectural Management, and Journal of Cleaner Production published two articles each. Eighteen journals published one article each between 2010 and 2023 on leadership styles in sustainable construction projects. However, there does not seem to be a relationship between the number of articles published by a journal and the impact factor of that journal. In fact, the high impact factor journals (IF: >10) published fewer articles in comparison to low ranked journals. Overall, the articles on leadership styles in maintaining sustainability in construction projects were published in highly regarded and impactful journals.

SL No.	Journal Name	Number of Articles Published	Impact Factor (IF)
1	Sustainability	5	3.9
2	Journal of Cleaner Production	2	11.07
3	Built Environment Project and Asset Management	2	2.5
4	International Journal of Construction Management	2	4.5
5	Engineering, Construction and Architectural Management	2	4.5
6	Sustainable Development	1	12.5
7	Sustainable Production and Consumption	1	12.1
8	Technological Forecasting and Social Change	1	10.88
9	Business Strategy and the Environment	1	10.32
10	Energy Policy	1	9.0
11	Journal of Environmental Management	1	8.7
12	Journal of Management in Engineering		7.4
13	Environmental Science and Pollution Research	1	5.8
14	Journal of Construction Engineering and Management	1	5.6
15	Business Process Management	1	4.3
16	Hindawi	1	4.3
17	International Journal of Construction Management	1	4.5
18	Construction Innovation	1	3.8
19	International Journal of Manpower	1	3.6
20	International Journal of Productivity and		2.2
20	Performance Management		5.5
21	Applied Sciences	1	2.9
22	Structural Survey	1	2.1
23	Procedia Computer Science	1	0.833

Table 2. Leading journals with numbers of articles published and their impact factors.

4.1.3. Citation Analysis

Citation analysis provides researchers with an understanding of the impact of articles in research fields. It is a useful index to determine the number of times an article is cited by other articles in the field [85]. The citations of the reviewed 31 articles were collected on 23rd September 2023. The citation analysis shows the reviewed articles on leadership in adopting sustainability in construction projects were cited 2064 times at that date. The most highly cited article, "The Impact of Transformational Leadership on Employee Sustainable Performance: The Mediating Role of Organizational Citizenship Behavior", published in the Journal of Cleaner Production, was cited 309 times, followed by "Factors affecting the implementation of green specifications in construction" in the International Journal of Construction Management (265 citations) and "Leadership competences of sustainable construction project managers" in the Journal of Cleaner Production (209 citations). Of the 31 articles, seven articles (22%) were cited more than 100 times, while 16 articles (52%) attracted less than 50 citations each, suggesting the recency of an interest in connecting leadership styles with integrating sustainability in construction projects. The low number of citations achieved by articles can be attributed to the short time interval between their publication and the citation collection. Table 3 shows the top seven articles that attracted more than 100 citations each. These are the most productive journals in researching leadership styles for adopting sustainable practices in construction projects. As shown in Figure 3, the top five journals that obtained the highest citations ranking include Sustainability (598 citations), Journal of Environmental Management (265 citations), Journal of Cleaner Production (230 citations), International Journal of Construction Management (162 citations) and Built Environment Project and Asset Management (158 citations). In this case, the

highest citations achieved by a journal had a proportional relationship with the number of articles published by the journal, except for Journal of Environmental Management. This journal published only one article, which achieved more citations than those in Engineering, Construction and Architectural Management.

Table 3. Highly cited articles in leadership styles in construction projects.

SL No.	Authors	Article Name	Citations
1	Jiang et al (2017) [86]	The Impact of Transformational Leadership on Employee Sustainable Performance: The Mediating Role of Organizational Citizenship Behavior	310
2	Lam et al. (2010) [55]	Factors affecting the implementation of green specifications in construction	265
3	Tabassi et al. (2016) [35]	Leadership competences of sustainable construction project managers	209
4	Zheng et al (2017) [87]	Impacts of Leadership on Project-Based Organizational Innovation Performance: The Mediator of Knowledge Sharing and Moderator of Social Capital	151
5	Zhao et al. (2016) [88]	Identifying critical leadership styles of project managers for green building projects	129
6	Zhang et al. (2018) [89]	How Does Transformational Leadership Promote Innovation in Construction? The Mediating Role of Innovation Climate and the Multilevel Moderation Role of Project Requirements	113
7	Chan et al. (2014) [90]	Role of Leadership in Fostering an Innovation Climate in Construction Firms	109



Figure 3. Number of citations by journals.

4.1.4. Research Methods Used in the Reviewed Articles

A critical analysis on the research methods used in the selected articles is presented in Figure 4. Four types of research methods were employed to investigate various aspects of leadership in adopting sustainability in construction projects. The methods were surveys, interviews, case studies, and a combination of surveys and interviews. It is not surprising to find that the survey technique was predominantly used in 81% of the reviewed articles. Surveys are commonly employed as a research method to explore many aspects of construction management research, such as leadership styles and emotional intelligence in

construction management [88,91]. In the survey method, targeted participants are provided with a range of qualitative and quantitative questions designed to elicit understanding of the relationship between independent and dependent variables. The survey method was followed by a combination of survey and interviews (10%), often considered a rigorous mixed method. The rest of the articles either adopted interviews (6%) or case study (3%) methods to explore appropriate leadership styles for integrating sustainability in construction projects.



Figure 4. Research methods used in the reviewed articles.

Figure 4 shows the research methods used in the reviewed articles. This analysis can help future researchers adopt research methods infrequently used in existing research. As is evident, a mixed-method research approach was rarely adopted by the reviewed articles, and future researchers may adopt this research method to bridge the gap and increase the robustness, validity, and credibility of the research.

4.1.5. Productive Countries, Institutions, and Authors

This section provides an account of the most influential countries, institutions, and authors engaged in sustainable construction projects. Drawing on the scores achieved through the application of the methodology outlined by Howard, Cole [84] presented in Table 1, Table 4 provides a ranking of countries and authors based on their leadership in sustainable construction projects, as well as the number of institutions, authors, articles, and the contribution scores of the authors. This analysis is critical, as it shows where the research leadership in sustainable construction projects is situated. It is clear from Table 4 that the higher the number of authors from a particular country, the higher the scores they achieved.

Based on the analysis, China is the leading country on research into leadership in sustainable construction projects, with a score of 10.14 derived from the highest number of institutions, authors, and articles. China contributed 12 articles, 36 authors, and 17 institutions, which accounts for approximately 39%, 35%, and 28% of the total articles, authors and institutions, respectively. This finding is consistent with other research areas in which China has led the way, such as green finance research [72]. The second position in the ranking of contributing authors was achieved by the United Kingdom (UK) with a score of 4.01, stemming from 8 institutions, 11 authors, and 12 articles. Developing countries Malaysia and Pakistan achieved the third and fourth positions in the ranking with scores of 2.32 and 1.6, respectively. It was surprising to observe that European countries, other than the UK, are not in the top ten countries from Europe (such as Poland and Spain) rank much lower. This suggests that although European nations are ahead in sustainability research, the leadership required for integrating sustainability in construction projects is not yet being investigated to a similar degree. Furthermore, it is mostly developing countries,

such as Malaysia, Pakistan, Ghana, and Sri Lanka, that are at the top of the ranking. Developed countries such as USA, Canada, and Australia lag behind in research on leadership for maintaining sustainability in construction projects. This suggests that affluent countries need to make a greater contribution to this research area. They usually have strong research funds and facilities to pursue advanced and sophisticated level of research.

Country	Institutions	Authors	Articles	Scores
China	17	36	12	10.14
UK	8	11	5	4.01
Malaysia	3	10	3	2.32
Pakistan	6	6	2	1.6
Russia	2	3	2	1.4
USA	3	4	3	1.29
Ghana	1	5	2	1.17
Sri Lanka	1	3	1	1
Republic of Korea	1	2	1	1
Canada	1	2	1	1
Australia	1	1	2	0.79
Saudi Arabia	3	4	2	0.77
Poland	1	2	1	0.68
Vietnam	2	2	1	0.68
South Africa	1	2	1	0.37
Qatar	1	2	1	0.37
Japan	1	1	1	0.32
Spain	1	1	1	0.32
Singapore	2	2	1	0.32
Dubai	1	1	1	0.21
Nepal	1	1	1	0.21
Turkey	1	1	1	0.18
Romania	1	1	1	0.12

Table 4. Productive countries, institutions, and authors of leadership styles in construction projects.

Furthermore, the analysis listed top institutions which contributed to the leadership of sustainable construction projects. Table 5 lists institutions from which at least two researchers contributed to the leadership of sustainable construction projects. This analysis shows future researchers the prominent institutions that can help them locate collaborators for conducting further research. At the same time, it provides an account of the leading countries that make significant contributions to the research on leadership styles in adopting sustainability practices in construction projects. Table 5 shows the top three institutions—The Hong Kong Polytechnic University, Universiti Sains Malaysia, and Kwame Nkrumah University of Science and Technology (KNUST) from China, Malaysia, and Ghana, respectively, with six authors in each, followed by Kunming University of Science and Technology (China), Tianjin University (China), and Hubei Engineering University (China) with five, four, and three authors, respectively. There are 24 institutions from China, Russia, the Republic of Korea, Canada, UK, Poland, Malaysia, and Saudi Arabia from which two researchers contributed to leadership in sustainability construction projects (see Table 5). The analysis suggests that most of the active authors in this research are from China, the UK, and Malaysia, which is in accordance with the results demonstrated in Table 4. Most of the researchers are from Asian/developing countries, which is an unexpected outcome considering that the European Union (EU) performed better than the rest of the world on the global sustainable development goals (SDGs) index in 2021. The top ten countries in the 2021 SDGs index are all from Europe [92]. Therefore, European countries were expected to make greater contributions to the research on leadership in adopting sustainability practices in construction projects. Other developed countries, such as the United States (US), Germany, and Australia did not seem to make any progress in this research area.

No.	Institutions	Country	Researchers
1	The Hong Kong Polytechnic University	China	6
2	Universiti Sains Malaysia	Malaysia	6
3	Kwame Nkrumah University of Science and Technology (KNUST)	Ghana	6
4	Kunming University of Science and Technology	China	5
5	Tianjin University	China	4
6	Hubei Engineering University	China	3
7	University of Moratuwa	Sri Lanka	3
8	Birmingham City Business School	UK	3
9	Universiti Tun Hussein Onn Malaysia	Malaysia	3
10	University of Johannesburg	South Africa	3
11	Catholic University of Lyon	Russia	2
12	Pukyong National University	Republic of Korea	2
13	University of Ottawa	Canada	2
14	London South Bank University	UK	2
15	University of Salford	UK	2
16	University of Liverpool	UK	2
17	Bydgoszcz University of Science and Technology	Poland	2
18	Zhejiang Shuren University	China	2
19	Shenzhen University	China	2
20	Jiangxi University of Finance and Economics	China	2
21	Nanjing University of Aeronautics and Astronautics	China	2
22	Wuhan University of Technology	China	2
23	Universiti Saians	Malaysia	2
24	Prince Sultan University	Saudi Arabia	2

Table 5. Prominent institutions, their countries, and the number of researchers.

4.2. Content Analysis

This section discusses some of the dominant themes pertinent to the leadership styles in sustainable construction projects based on the selected articles in this review.

4.2.1. Theme 1: Critical Leadership Competencies for Sustainability

In the past few decades, there has been a transformation in the leadership competencies required for the success of sustainable construction projects [56]. There is an agreement among scholars that a new set of competencies is required for the leaders of the 21st century [57]. As more attention has been paid to sustainable development goals and achieving net zero by 2050, leaders have been making continuous efforts to include the triple bottom line (TBL) into their business models [53]. Leaders need to possess a different spectrum of competences in contemporary times [48,93–95]. Construction organisations require leaders who are able to develop a strategic mission and vision for transitioning to a sustainable society [21]. Construction projects [96]. In particular, leadership competence contributes significantly to the development of environmental practices, as construction managers are highly focused on reducing resource usage and saving energy by adopting sustainable practices in construction projects [96].

There is a lack of agreement on the definition of competencies [97]. Competencies are defined as skills, personal characteristics, people's knowledge, self-concepts, traits and motives [98]. The nine leadership competencies, based on great man and trait theories, behavioural theories, transactional leadership theory, and transformational leadership theory are adaptability, values, cognitive skills, transformational ability, self-awareness, social skills, communication skills, human orientation, and organisational skills [57]. On the other hand, human orientation, organisational skills, adaptability and flexibility, values, cognitive skills, self-awareness, transformational ability, and communication skills are required leadership competencies according to emerging leadership theories, such as strategic leadership theory, shared leadership, team leadership, complexity leadership, authentic leadership, global leadership, E-leadership, and servant leadership theory [57].

Critical competencies of leaders of sustainable construction projects, based on the reviewed articles, can be categorised as intellectual, managerial, and transformational leadership competencies [35]. Intellectual competencies include critical analysis and judgement, vision and imagination, and strategic perspective. Managerial competencies include resource management, engaging communication, empowerment, development, and achievement, while strategic leadership competencies include critical analysis, engaging communication, resource management, vision and imagination, and empowerment. Transformational leadership competencies develop followers into leaders and inspire them to develop [35]. Tabassi, Roufechaei [35] argued that intellectual competencies are more significant than managerial competencies and that transformational leadership qualities are better for sustainable achievement. On other hand, Meng, Xue [99] established that intellectual competence, managerial competence and emotional and social competence are key in order to push forward sustainable construction project success. To drive and transform sustainable development, project leaders need to be able to showcase inspirational, integrative, identity, implementation, and institutional capabilities [100]. Furthermore, Knight and Paterson [64] highlighted that the behavioural competencies of sustainability leaders include being results-driven, an inclusive operator, a change agent, ethically oriented, and a visionary thinker. The three top leadership competencies for green building projects, as identified by Zhao, Hwang [88] are (i) striving for work performance and productivity; (ii) having a high concern for work tasks; and (iii) directing subordinates with clear roles and goals.

4.2.2. Theme 2: Ideal Leadership Style—No One-Size-Fits-All

With the aim of identifying an ideal leadership style for implementing sustainability practices in construction projects, a thorough investigation of the reviewed literature was undertaken. A transformational leadership style was proposed as offering numerous benefits for sustainable construction projects (discussed in Section 4.2.3 of this paper). However, there is no best leadership style for all situations in the context of sustainable construction projects [53]. In a dynamic construction environment, with additional challenges related to embedding sustainability practices, project leaders with different leadership styles exhibit different behavioural consequences [101]. Various leadership styles are required, depending on various situations, given the complex environment of construction projects. Leaders need to be flexible and match their styles to suit the situation [101]. Leaders need to adopt different leadership styles, depending on the situation, to meet the demand of a volatile environment and incorporate sustainable practices into their projects. For instance, leaders can adapt an autocratic leadership style under critical situations. An autocratic leadership style can be used to make decisions quickly under critical circumstances, where leaders are able to allocate tasks and give specific orders to employees. A democratic leadership style is preferred when companies are not undergoing substantial economic difficulties [101]. A good leader can adjust their leadership styles to varying environments, depending on the situation and context [93]. In addition, implementing sustainability practices into the construction project process adds new levels of complexity to the system. Altogether, it is suggested that construction project leaders need to be adaptive, flexible, and agile in their leadership techniques.

4.2.3. Theme 3: Prominent Leadership Styles

The reviewed literature suggests that there is no 'one size fits all' in terms of the leadership styles of construction project managers. The advantages of some leadership styles outweigh others when it comes to integrating sustainability practices. Eleven leadership styles were discussed, including transformational, transactional, democratic, strategic, laissez-faire, autocratic, innovative, visionary, supportive, ethical, and responsible. As shown in Table 6, the top three widely discussed leadership styles were transformational, transactional, and democratic. Of the articles under review, 12 (39%) explored transformational leadership in relation to sustainable performance in construction projects. Transactional, democratic, and laissez-faire leadership styles were investigated in three (9.6%), two (6.4%), and two (6.4%) articles, respectively. Other leadership styles such as strategic, autocratic, innovative, visionary, supportive, ethical and responsible leadership were rarely discussed, with one (3.2%) article each. The following section discusses how a transformational leadership style is beneficial in integrating sustainability practices in construction projects.

Table 6. Leadership styles prominent in the reviewed articles.

Leadership Styles	Characteristics	Sources
Transformational	Empowers and inspires followers, drives toward excellent outcomes and results, provides followers with high morale and meaningful work.	[35,86,87,89,90,93,99,100,102–105]
Transactional	Leaders and followers have a relationship based on mutual interests. Leaders offer what followers want, and followers receive what they want from leaders. Leaders reward and recognise followers based on accomplishments.	[87,93,102]
Democratic	Leaders encourage employees to express their opinions and ideas freely, contribute to employees' self-development, participate in employees' work, make decisions through group discussion with employees.	[93,101].
Laissez-faire	Lack of leadership or zero leadership by failing to provide subordinates with information or feedback.	[93,101]
Strategic	Required in high-complexity, ambiguous, and fast-changing environments, this role motivates others to take actions in the best interest of the business and makes strategic plans based on analysis.	[93]
Autocratic	Makes decision quickly, allocates tasks to followers, in contrast to democratic leadership styles.	[101]
Innovative	Leaders make use of innovation and creativity to manage followers and projects, encourage followers to turn their innovation into reality.	[106]
Visionary	Leaders create a definite sense of direction for future and long-term goals, can see the bigger picture, bringing about innovative changes.	[107]
Supportive	Leaders support the followers, behave ethically, and pay attention to subordinates' opinions.	[108]
Ethical	Leaders demonstrate honesty, fair treatment, and communication of ethical values. They also serve as role models for ethical behaviours, reward ethical behaviour, and hold subordinates accountable for unethical conduct.	[109]
Responsible leadership	Leaders make sustainable business decisions that consider the interests of all stakeholders, including shareholders, employees, clients, suppliers, the community, the environment, and future generations.	[110]

4.2.4. Theme 4: Transformational Leadership

Transformational leadership styles, discussed widely in the existing literature, have contributed in various ways to different aspects of sustainability in construction projects. Figure 5 shows that transformational leadership has been examined in relation to green innovation, sustainable project performances, the promotion of innovation, knowledge sharing, and green organisational citizenship behaviour. These five aspects are discussed below in the context of transformational leadership.



Figure 5. Contribution of transformational leadership to various sustainability practices.

Transformational Leadership and Green Innovation

Green innovation refers to innovation in technology that enables savings in materials and energy, promote product recycling, and contribute to the reduction of pollution and harmful gases, ultimately minimising environmental footprint [111]. Green innovation involves the use of environmentally oriented products and production processes that aim to gain sustainable development, thus contributing to the improvement of environmental performances [112]. Examples of green innovation include the installation of solar energy, the use of biodegradable materials, and electrochromic smart glazing. The implementation of green innovation in construction projects requires project managers to demonstrate an appropriate leadership style, and the literature reviewed suggests that transformational leadership styles contribute significantly to green innovation in construction projects [47]. Leaders with transformational leadership styles promote green innovation, which can potentially aid in achieving the SDGs and reaching the net-zero target [35,102,103,105]. Green innovation, capitalised through transformational leadership practices, improve environmental performance and organisational productivity [113]. In order to improve environmental performance, green innovation is critical because of two reasons. Firstly, it reduces the cost of environmental damage and meets stakeholders' satisfaction. Secondly, projects maintaining environmentally friendly practices help maintain sustainable development and improve organisations' images [105,114]. Based on previous research, it appears that green innovation achieved through the application of transformational leadership contributes significantly to the achievement of environmental goals aligned with the triple bottom line [112,115]. It is perhaps interesting to explore in the future why the practice of green innovation plays a role in achieving the social and economic dimensions of the triple bottom line.

Transformational Leadership and Sustainable Project Performances

Many construction organisations are now focusing on incorporating sustainability practices in their project processes and products to achieve sustainable development goals and comply with the Paris Agreement to pursue net-zero initiatives [23]. Countries around the world promised to limit their greenhouse gas emissions. Construction projects are responsible for emitting the highest amount of greenhouse gases [95]. Therefore, construction organisations need to take stringent steps to promote sustainability practices in their projects. Project managers play a critical role in achieving sustainability in project

performance [116]. Project managers need to possess appropriate leadership attributes in order to maintain sustainable project performance [35]. The literature reviewed suggests that transformational leadership contributes significantly to sustainable-based project performance. Leaders with transformational leadership styles are better capable of promoting sustainability practices than leaders with other styles [86,96,102,117]. Sustainable development balances the economic, social, and environmental domains of the triple bottom line [118]. Transformational leadership styles contribute to improving sustainable project performance; however, the reviewed studies did not explicitly demonstrate how transformational leadership influences the social, economic, and environmental aspects of the triple bottom line [53]. Furthermore, project managers' transformational leadership qualities contribute to achieving the success criteria for sustainable buildings. When further investigated, the success criteria for sustainable buildings. When further investigated, the success criteria for sustainable buildings involve energy efficiency, and innovation [48]. These criteria appear to be heavily focused on the environmental dimensions of the triple bottom line.

Transformational Leadership and Knowledge Sharing

There are two types of knowledge: explicit and tacit. In a project team, experienced project members can share the knowledge with those that are new to the role. Knowledge creation is a continuous process in an organisation, and sharing knowledge in projects is one of the success factors for effective delivery [119]. Therefore, it is critical to share knowledge across the project team members.

Due to the rapid changes in technology and an the exponential growth of knowledge, it is highly unlikely that an individual possesses all the required knowledge [120]. Hence, knowledge should be disseminated and transferred for effective use. In a competitive world, with various uncertainties and challenges, and an increasing pressure on projects to be aligned with the SDGs, project team members are required to exchange knowledge among themselves [121]. This is even more critical when sustainability is embedded in the construction project. Project leaders need to create a platform for team members to share information about various sustainable practices aligned with sustainable environmental, social, and economic goals [122]. To promote sustainability in construction projects, knowledge sharing should be enhanced [87]. Due to the extraordinary emphasis on environmental protection, organisations invest in environmental knowledge sharing [123]. Increased focus on environmental knowledge sharing enhances employees' environmental passion and organisations' performance [46]. The reviewed literature suggests that leaders demonstrating transformational leadership styles contribute to knowledge sharing among project team members, which can increase the propensity of project success [87,89].

Transformational Leadership and Promotion of Innovation

Sustainable innovation goes beyond traditional innovation [124]. Sustainable innovation involves much more complexity and challenges than traditional innovation. Making decisions in complex situations is difficult, even more so when environmental and social stakeholders are involved in this process [125]. Doing this requires a leadership style that promotes innovation and making decisions under complex circumstances. Innovation fosters cost effectiveness and productivity, improving the sustainable performance of organisations [86].

Transformational leadership promotes a mutual culture for innovation in which employees can freely share ideas and thoughts regarding innovation in sustainability. Transformational leadership positively influences an innovative climate in construction organisations [87,89,126]. The transformational leadership of project leaders motivates employees to be more innovative. A supportive culture helps employees generate ideas, seek available sources, and implement innovation schemes [89]. Transformational leaders encourage employees to be more innovative, encourage creativity, and promote a mutual vision [102]. While transformational leadership styles potentially promote innovative practices in construction projects, there is a lack of studies exploring the promotion of innovation in the context of the social, economic, or environmental dimensions of the triple bottom line.

Transformational Leadership and Green Organisational Citizenship Behaviour

Employees' voluntary participation in green activities can play significant roles in promoting environmental progress in organisations. Green organisational behaviour refers to voluntary behaviour that promotes sustainable development and environmental conservation without any expectations of awards for undertaking additional volunteer behaviour [127]. Employees' active participation and involvement can accelerate the integration of environmental standards in construction projects. Appropriate leadership styles are required for promoting green organisational citizenship behaviour.

Given the numerous advantages offered by transformational leadership styles, project managers need to pay close attention to this style in order to cultivate organisational citizenship behaviour [86]. Transformational leaders improve employees' green organisational citizenship behaviour through green innovation [104,128]. Leaders displaying transformational leadership encourage employees to set goals with a high degree of collectivism and maintain a harmonious relationship between subordinates [86]. These leaders improve subordinates' sustainable performance and develop a sense of belonging, creating a cooperative and transformational atmosphere, which inspires them to go above and beyond an employee's duties. Therefore, transformational leadership has a great impact on the sustainable performance of employees [86] and team integration [99]. Transformational leaders stimulate social exchange between leaders and followers, thus developing organisational citizenship behaviour [129]. Transformational leaders facilitate employees' collectivism and help them achieve goals, which are the building blocks for employees to show organisational citizenship behaviour [86].

4.2.5. Theme 5: Leadership Styles and TBL

The reviewed articles highlighted eleven different types of leadership styles, as shown in Table 6. This section demonstrates the relationship between leadership styles and its association with the triple bottom line. The triple bottom line is composed of the three pillars of sustainability: economy, environment, and society. These three elements constantly interact with each other [130]. As discussed above, the transformational leadership style, being the most prominently discussed, contributes significantly to the promotion of innovation, sustainable project performance, knowledge sharing, innovation, and organisational citizenship behaviour. However, other leadership styles listed in Table 6 have the capacity to achieve various sustainability aspects.

This review aims to explore the relationship between leadership styles and the economic, environmental, and social aspects of the triple bottom line. The majority of the 31 reviewed studies did not demonstrate any relationship between leadership styles and the three elements of the triple bottom line. Only five of the 31 reviewed studies exhibited a direct relationship between leadership styles and the triple bottom line [103,106,107,110].

Chassagnon and Haned [106] empirically tested that leaders with innovative leadership styles tend to adopt environmentally friendly practices. Construction organisations need to embrace environmental innovations that can positively influence the environmental pillar of the triple bottom line. Innovative leaders have the ability to introduce any kind of environmental innovation. Innovative practices should be applied to both the products and processes of construction projects. However, their study did not provide any detailed orientation with regards to the product and process in construction projects.

Visionary leadership and its associated aspects were explored by Ismail, El Irani [107]. The results demonstrate that visionary leadership mediates the relationship between green human resource management and organisational citizenship behaviour. Green human resource management entails building a workforce who is capable of carrying out duties and responsibilities that are aligned with environmental sustainability [131]. Green

human resource management acts as a strategy to achieve environmental sustainability and improve employees' behaviour [107].

The relationship between ethical leadership and social responsibility was explored by Li, Ying [109]. Social responsibility is critical in construction projects, as it facilitates the reduction of environmental and social adverse impacts. Leaders demonstrating ethical leadership can exert a positive impact on the social responsibility of construction projects. Given the importance of construction project managers' ethical leadership in maintaining social responsibility, construction organisations should promote leaders with an ethical leadership style so that they can promote social responsibility. By demonstrating social responsibility, ethical leadership styles positively influence the social element of the triple bottom line [109].

The moderating effects of green transformational leadership between corporate social responsibility and perceived organisational support were tested in the study by Kusi, Zhao [103]. Corporate social responsibility is an organisation's duty to operate the business in an economically, socially, and environmentally sustainable manner [132]. Green transformational leadership positively influences the relationship between corporate social responsibility and perceived organisational support. When leaders of organisations demonstrate transformational leadership, employees feel supported, leading to better maintenance of corporate social responsibility. Employees practising corporate social responsibility become proactive in improving organisational performance [103].

4.2.6. Theme 6: Cultural Impacts on Leadership Styles

Cultural settings can have a significant impact on leadership styles. A positive correlation exists between culture and leadership styles [133]. It is important to understand a country's culture and associated leadership styles to conduct business [134]. Cultures with high power distance follow a centralised and hierarchical decision-making process, while authoritative opinion is practiced in a low power-distance culture [135]. Culture has several dimensions, such as gender egalitarianism, human orientation, performance orientation, future orientation, and power distance [136]. These dimensions influence the relationship between leadership styles and employee engagement. Understanding this correlation is not the scope of this research, and the reviewed studies did not serve this purpose either. However, this review can establish a correlation between countries (developing, developed, low and high context culture) and their adopted leadership styles. This may help construction project practitioners understand the nuances of cultural contexts and craft their leadership styles accordingly, as there is no one-size-fits-all leadership style [53].

The majority of the reviewed studies found transformational leadership beneficial. The transformational leadership styles of construction project managers contributed positively to supply chain learning, green innovation [105], and the improvement of success criteria for sustainable buildings [48]. In addition, they enhanced team integration [45], promoted an innovative climate [89,90], facilitated employees' organisational citizenship behaviour [104], and improved employees' sustainable performance [86]. If the cultural contexts of these outcomes are investigated, most of the studies were conducted in high-context and high-power-distance cultures such as Vietnam, Malaysia, Hong Kong, and China. This finding is consistent with the results proposed by Crede, Jong [137]. Transformational leadership has significant impacts in developing countries, including the Middle East, Latin America, Sub-Saharan Africa, and southern Asia [137].

5. Discussion

This research provided an overview of leadership styles for integrating sustainability in construction projects. Adopting a systematic literature review, this research used a mixed-method approach to investigate the existing literature on leadership for adopting sustainability practices in construction projects. The findings of this study were based on 31 articles that were gathered through a systematic literature review. The results suggest that the highest number of publications was observed in 2022, due to the wide awareness of adopting sustainability in construction projects. Due to an increased attraction to sustainability within construction projects, stemming from their contribution to increased carbon and greenhouse gas emissions, as well as the production of various pollutants, researchers continue to research various leadership styles in the context of sustainable construction. This has resulted in a wide range of journals publishing research in this area. Sustainability is one of the top journals that publishes extensively on leadership in sustainable construction projects.

A citation analysis was conducted to identify the most impactful articles in terms of citations. "The Impact of Transformational Leadership on Employee Sustainable Performance: The Mediating Role of Organizational Citizenship Behavior" by Jiang, Zhao [86] achieved the maximum number of citations (310) at the time of writing this article. This study investigated how transformational leadership styles improve employees' sustainable performance through organisational citizenship behaviour. It suggests that organisations need to pay close attention to developing transformational leadership in construction project managers to improve the sustainable performance of employees.

The bibliometric analysis identified that the survey approach is the dominant research method, due to its convenience and simplicity in executing. Through surveys, various relationships between leadership styles and sustainability (social, economic, and environmental) were tested. However, mixed-method approaches should be used in future research for optimising results and improving the validity of research findings. An analysis on the most productive authors, countries, and institutions showed that China, Malaysia, and the UK are the leading countries contributing the most research on leadership that integrates sustainability in construction projects. Socially and economically developed countries need to contribute to working towards achieving sustainable development goals (SDGs). The underrepresentation of European countries in exploring leadership styles for adopting sustainability practices was surprising, as they appear to be pioneers in adopting sustainability practices in construction projects. Researchers from China, Malaysia, and the UK contributed most of the research outputs in leadership styles for adopting sustainability practices in construction projects.

The articles were analysed through content analysis. The critical competencies required for the leaders of the 21st century have been changing dramatically. The competencies required for traditional leaders, focusing on the iron triangle of projects, are no longer suitable for leadership in adopting sustainability practices. The critical competencies of leaders required for adopting sustainability practices have shifted to a more comprehensive level, covering intellectual competencies, managerial competencies, and transformational leadership competencies. These findings are aligned with the critical competencies associated with green construction, such as analytical thinking, delegation, negotiation, problem-solving, decision-making, teamwork, chairing meetings, leadership, presentation, and understanding human behaviour [138]. Leadership has been recognised as one of the powerful tools for adopting sustainability practices in construction projects with positive implications for the success of green projects. Leadership has a pivotal role in achieving sustainable performances. Furthermore, it has been found that one leadership style is not suitable in all situations. Different leadership styles work better in different situations. Therefore, there is no single leadership style that is appropriate in all situations.

Leadership is one of the essential skills required for project success in construction projects. Leadership is essential for obtaining success at both the project and organisational levels. Many scholars, therefore, focus on the role and competencies of leaders to achieve sustainable construction. Leadership competencies mediate the relationship between sustainability performance and environmental, economic, and social practices. There are various organisational leadership styles, such as transactional, transformational, charismatic, democratic, servant, autocratic, consultative, laissez-faire, joint decision-making, authoritative, participative, tyrant, task-oriented, relationship-oriented, production-oriented, employee-oriented, delegating, authority compliance, impoverished management, and team management [139]. Although all these leadership styles contribute to sustainable construction projects to different extents, transformational leadership is the dominant leadership style integrating social, environmental, and economic success in construction projects. Transformational leadership styles have proven to be effective for bringing various benefits to organisations and employees.

Addressing sustainable development goals (SDGs) requires construction projects to adopt innovation in construction projects. Based on technology, green innovation refers to the adoption of green products and production processes to achieve sustainable development [140]. Product innovation involves the use of products which are recyclable and reusable, preventing pollution and saving energy. On the other hand, processes innovation is about integrating innovation into construction processes [141]. Transformational leaders can motivate employees to apply creativity and improve their performance [142]. Transformational leadership can improve both product and process innovation in construction projects. Construction professionals with transformational leadership skills can promote green innovation in construction projects, which will benefit organisations by helping them achieve a competitive advantage and a positive reputation among stakeholders. Construction companies should leverage transformational leadership as a strategic resource to adopt green innovation both in products and in processes.

Successful project performance is the most desired outcome of any project organisation. Achieving the iron triangle of cost, time, and quality does not comprise the key performance indicators anymore. A holistic approach to project success is required in this era, in which maintaining sustainability is one of the pressing issues. A construction project involves dynamic environments with non-linear and reductionist approaches. In addition, considering sustainability practices poses additional challenges. Transformational leaders can maintain environmental, social, and economic practices in construction projects. This finding is aligned with previous studies advocating that transformational leadership can positively influence project successes.

Innovation is considered one of the key drivers for the successful implementation of construction projects. However, the construction industry is considered as non-innovative and conservative. Leadership is regarded as a key factor for facilitating innovation in construction projects. Transformational leaders can motivate employees, create a sense of an innovative culture, and encourage creativity and innovative behaviours. Sustainable innovation promotes competitive advantages, achieves financial performance, and engages employees. Sustainability should be embedded across the entire value chain. Innovation is the only way to win the sustainable development goals (SDG) race and achieve a sustainable future. Radical, disruptive innovation can significantly shift the economics of possible solutions and the timeline for delivering them. With the potential to fundamentally change the cost of achieving progress, innovation can support and advance sustainability efforts. Transformational leaders positively develop an innovation climate and motivate individuals' innovative behaviours in construction projects.

Employees are a valuable resource for any organisation, and they can help any organisation achieve competitive advantages as per the resource-based view theory. Employees' performance is influenced by transformational leadership style of the manager. Project managers demonstrating transformational leadership achieve better success in projects and they can motivate employees through their unique leadership style. Employees' sustainable performance is influenced by transformational leadership. Transformational leadership improves the leader-subordinate relationship and organisational climate, which in turn helps employees to improve the spirit of collectivism and undertake more work outside of and in addition to their own duties, but work which is beneficial to organisational development. Therefore, transformational leadership has a stronger impact on sustainable performance. This leadership style also improves employees' organisational citizenship behaviours.

6. Future Research Agenda

This review proposes a range of areas which could be explored in future research. The future research areas are explained below and tabulated in Table 7.

Table 7. Research areas to be explored in future research.

Research Theme	Research Area
Research theme 1 Leadership styles and net-zero targets	How different leadership styles directly influence the transition to net-zero initiatives and contribute to winning the race to net zero.
Research theme 2 Sustainable leadership in construction projects	Empirical investigation of casual relationship between sustainable leadership and projects' sustainable performance.
Research theme 3 Leadership competencies in the 21st century	Investigation of leadership competencies for sustainable leadership styles.
Research theme 4 Leadership style and success of sustainable construction projects	Examination of construction project managers' competencies and leadership styles in various contexts other than Malaysia.
Research theme 5 Effects of individual, team, and organisational factors on leadership styles	Investigating how variables at different levels interact to determine the appropriate leadership styles and competencies in sustainable construction projects.
Research theme 6 Leadership styles and project sizes	Scrutinizing the correlation between leadership styles and leadership competencies requires different levels of attention based on the project's nature, size, and scale.
Research theme 7 Research in various socio-economic and cultural contexts	Examination of various leadership styles in both developing and developed countries along with cross cultural comparisons.
Research theme 8 Adoption of numerous research approaches	Use of qualitative (case studies, interviews, focus groups, and observations) and mixed-method approaches for improving robustness and triangulation. A quantitative exploration of the impact of leadership styles on various sustainability metrics.
Research theme 9 Use of longitudinal study	The adoption of longitudinal studies to test the relationships among leadership styles and project success, knowledge management, innovation, and project team development in sustainable construction projects. Project sizes and scales can be added as moderators to explore the dynamic relationships over time.
Research theme 10 Self-reported measures and data	The execution of research by using multiple data sources and triangulation to avoid the bias of self-reported data.
Research theme 11 Collaborative research between industry and academia	Application of research findings in real-life sustainable construction projects. Organisation of joint workshops, focus groups, and seminars between the construction industry and academia to discuss challenges and scopes for further research.
Research theme 12 Impact of Industry 4.0 on leadership	Identification of the required leadership knowledge, skills, and attributes (KSA) to embrace technological changes and deliver projects that integrate sustainability practices.
Research theme 13 Challenges in implementing appropriate leadership styles in construction	Investigation of the leadership challenges faced by construction leaders when implementing sustainability initiatives in construction projects.

6.1. Leadership Styles to Achieve Net-Zero Targets

Reducing the greenhouse gas emission to zero by 2050 is a global challenge. The coalition of countries is growing to achieve the net-zero target [23]. Construction projects contribute significantly to greenhouse gas emissions [143]. Therefore, the sector can make a huge contribution to achieving net-zero. This requires project managers to possess strong leadership skills and associated competencies to drive this transformation. Future researchers may explore how different leadership styles have a direct influence on the transition to net-zero initiatives and on winning the race to net-zero.

6.2. Sustainable Leadership in Construction Projects

Sustainable leaders manage projects with environment, society, and long-term sustainable development goals in mind. Organisations need to develop both short-term and long-term strategies to achieve the SDGs [144]. Sustainable leadership is required to curb the alarming rate of climate change by developing strategies to meet the triple bottom line criteria of social, environmental, and financial performance [145], which have not yet been explored in the existing literature. Future researchers may empirically investigate how sustainable leadership can improve projects' sustainable performance.

6.3. Leadership Competencies in the 21st Century

The skills and attributes of conventional leaders are highly unlikely to be effective for the emerging challenges in the 21st century, with pressure on incorporating sustainability practices. Leaders for sustainable construction projects require specific sets of competencies. Ngayo Fotso [57] conducted an integrated literature review and identified competencies relevant for the 21st century. However, sustainable leadership may require a different set of competencies. This area can be further researched.

6.4. Leadership Style and Success of Sustainable Construction Projects

The success criteria of traditional construction projects may not be akin to the success criteria of sustainable construction projects. The success criteria of construction projects may be changing dramatically as projects aim to achieve sustainability goals. As per the authors' knowledge, only Tabassi, Roufechaei [35] explored the relationship between construction project managers' competencies and leadership styles in the Malaysian context. Future research can be conducted to explore this area further in various settings and contexts.

6.5. Effects of Individual, Team, and Organisational Factors on Leadership Styles

There is a dearth of research investigating how individual, team, and organisational factors contribute to leadership styles for sustainable construction projects. It is anticipated that leadership styles in sustainable construction projects can be influenced by individual, team, and organisational-level antecedents. Further research needs to be carried out to explore how variables at different levels interact to determine the appropriate leadership styles and competencies in sustainable construction projects.

6.6. Leadership Styles and Project Sizes

Sustainable construction projects can be of various sizes, scales, and nature. While one-size-fits-all leadership is not suitable for sustainable construction projects, the reviewed literature did not investigate whether leadership styles are influenced by different project types, including those that are operational, strategic, and compliance-centred. Project complexity can have an impact on the leadership styles of the project managers. Future research might explore whether project leadership styles and leadership competencies require different attention based on project nature, sizes, and scales.

6.7. Research in Various Socio-Economic and Cultural Contexts

The studies reviewed in this research were mostly conducted in China, Pakistan, and Malaysia [35,89,90,104,108,146]. This phenomenon limits the generalisation of the findings. Although other countries contributed to this promising research area, their contribution was not significant. The majority of the reviewed studies called for the replication of similar studies in different socio-economic and cultural contexts [90,108,147]. Therefore, it is recommended that leadership styles for sustainable construction projects should be explored in other cultural settings, both in developing and in developed countries. The same study can propose different results when it comes to affluent and impoverished countries. Future studies can also consider some cross-cultural comparisons to gain insight into the leadership styles required for sustainable construction projects.

6.8. Adoption of Numerous Research Approaches

Most of the reviewed studies' data collection was based on survey/questionnaire [96,100,105,148]. While survey technique is useful for collecting large quantities of data, the findings derived from survey often lack rigour and in-depth understanding of the phenomena. Therefore, it is recommended that leadership and its various constructs be explored using qualitative research approaches, using case studies, interviews, focus groups and observations. In addition, future researcher may consider collecting data using mixed methods which be employed to triangulate the findings to gain more in-depth understanding and robustness. Future research should also aim to quantitatively explore the impact of leadership styles on various sustainability metrics.

6.9. Use of Longitudinal Study

One of the widespread limitations of the reviewed literature was the employment of cross-sectional studies, which limits the causality of variables over time [45,96,100]. Future research may concentrate on conducting longitudinal studies to test the relationships between leadership styles and various factors such as project success, knowledge management, innovation, and project team development in sustainable construction projects. Project sizes and scales can be added as moderators to explore the dynamic relationships over time.

6.10. Self-Reported Measures and Data

Some studies adopted self-reported measures and self-evaluated data of project managers' opinions [90,104]. Although self-reported measures are considered reliable in collecting data for various studies, this could result in common method variance [90]. It is recommended that subjective measures be complemented with objective measures to increase the confidence of the findings. Future researchers may avoid the bias of self-reported and single-source data by using multiple data sources.

6.11. Collaborative Research between Academia and Industry

The construction industry and academia can work collaboratively to contribute to both theory and practice. The findings of various research in leadership styles for sustainability in construction projects can be implemented in projects where sustainability is practiced. Joint workshops, focus groups, and seminars can be organised to discuss challenges and various initiatives. Academics can conduct research based on the industry's needs and purposes to bridge the gap between theory and practice. Theoretical and practical implications should be given due consideration when contemplating further research.

6.12. Impact of Industry 4.0 on Leadership in Construction

The construction industry's transformation to Industry 4.0 is progressing rapidly. Industry 4.0 refers to the fourth industrial revolution, which involves the digital transformation of the entire construction industry, from smart manufacturing to the digitisation of the entire value chain [149]. The implementation of Industry 4.0 involves the integration of various technologies including but not limited to Digital, and Operation Technologies (IDOT) and Artificial Intelligence (AI) [150]. Furthermore, achieving sustainability target is an additional challenge in the realm of Industry 4.0 [151]. Leading organisations have already adopted advanced technologies such as industrial robots, cloud computing and artificial intelligence as it has positive impacts on sustainability [150]. Construction leaders are required to play a crucial role and should be at the forefront in the transformation to Industry 4.0 [11,152]. Leaders need to possess cognitive skills, interpersonal skills, and strategic skills to navigate through this transformation. This area requires further exploration. Future researchers can identify the required leadership knowledge, skills, and attributes (KSA) to embrace the technological change and deliver projects that integrate sustainability practices.

6.13. Challenges in Implementing Appropriate Leadership Styles in Construction

Construction leaders may face a number of challenges when implementing effective leadership styles in sustainable construction projects. This review suggests there is a gap in the existing literature that needs to be explored. There are some studies that explored barriers to applying appropriate leadership styles, but those studies were generic in nature [153–155]. The barriers included organisational structures, identity rejection, and identity uncertainty [154]. Recently, Zulu, Saad [11] identified the challenges and barriers faced by leaders in facilitating the uptake of digitalisation within the UK construction sector. Leadership characteristics, management, and organisational barriers; resource constraints; technological factors; risk; and attitude perceptions were highlighted as barriers to digital leadership enactment [11]. Future research can explore the leadership challenges faced by construction leaders when implementing sustainability initiatives in construction projects.

7. Implications

This research has several practical and theoretical implications. The following section discusses the implications of this research on leadership styles in adopting sustainability practices for construction projects through the lens of practice and theory.

7.1. Practical Implications

Although this paper is based on a systematic literature review (non-empirical data), the present study provides a holistic overview of research on leadership styles integrating sustainable practices in construction projects. Templier and Paré [156] and Cummings and Daellenbach [157] emphasized that stand-alone literature reviews—such as the present study—can serve as valuable overviews of a topic for practitioners, thus having real-world implications. Project professionals can benefit from this research, offering an in-depth understanding of the impacts of leadership styles on integrating sustainable practices in construction projects. In volatile, dynamic, and unstable business environments, effective leadership is one of the most sought-after tools for success in projects. Understanding the relationship between leadership styles and the inclusion of sustainability practices in construction projects is vital, as it can facilitate project professionals' decision-making process.

By providing a detailed account of transformational leadership, professionals can benefit by adopting sustainable project practices. Bibliometric analysis can assist project professionals in multiple ways, such as understanding the location of prominent journals to explore more about the topic and identifying productive authors likely to conduct future research using novel and different research methods. In summary, the findings of this research can provide project professionals with a guideline regarding the application of appropriate leadership styles in construction projects. Adopting sustainability principles in construction projects provides a competitive advantage to organisations. Construction managers are required to promote social and environmental practices, and this requires effective leadership styles. This study can be a reference point for construction project leaders aiming to adopt a leadership style that promises a brighter future, aligned with addressing the SDGs by 2050.

7.2. Theoretical Implications

This research provided a holistic overview of the literature on leadership styles for sustainable construction projects. Leadership is one the key tools that can contribute to achieving sustainable practices in construction projects. The existing literature suggests that some of the leadership styles have been discussed in the literature in relation to the improvement of triple bottom line (TBL) (social, economic and environment). This research bridges the gap between the existing literature and a holistic approach to leadership styles for the sustainability of construction projects. To the authors' knowledge, no research has been conducted as a systematic literature review to establish leadership and sustainability in construction projects. This research can be regarded as one of the reference points for future researchers to conduct future research, as outlined in this research. Future researchers can contribute to the existing research by laying the groundwork for leadership studies in construction projects. This study contributes to the existing theory by demonstrating

appropriate leadership styles to combat environmental, social, and economic challenges in the days ahead. Another theoretical implication of this research is that it provides avenues for future research. This is one of the first attempts to examine comprehensively the leadership styles and sustainability of construction projects. This study continues the work of Piwowar-Sulej and Iqbal [36], where a systematic literature review was conducted linking leadership styles and sustainable performance in a general context. We have added to that by incorporating the context of the construction industry to establish the relationship further. This research also adds to the methodological aspect by conducting a systematic literature review in the context of construction projects.

8. Conclusions

The purpose of this research was to identify an appropriate leadership style for implementing sustainable practices in construction projects to address global environmental, social, and economic challenges. Based on a systematic literature review, the results suggest that leaders must be adaptive, flexible, and agile, depending on the situation. A single leadership style is not appropriate for all contexts in construction projects. However, transformational leaders contribute significantly to the sustainability of construction projects by promoting green innovation, encouraging knowledge sharing, fostering innovation behaviours, and stimulating organisational citizenship behaviour.

While this research addresses one of the promising and emerging areas by exploring the status quo of leadership in sustainable construction projects and offering avenues for future research, the limitations of this research must be acknowledged. This review was limited to only one database: Scopus. There may be other resources available in other databases. Future research may consider exploring other databases in addition to Scopus to identify other potential studies related to leadership styles in the construction industry. Furthermore, this research did not take into account grey literature, such as industry reports and conference papers, due to the scope of this research. Industry reports are mostly non-peer-reviewed, while conference papers sometimes lack rigour. Considering these aspects, industry reports and conference papers were deemed inappropriate for this research. However, future researchers can tap into these documents for more extended reviews. Although the authors conducted the screening processes as accurately as possible, it may contain some cognitive bias.

There is no alternative to an effective leader for promoting sustainability in construction projects. This research could assist construction project managers in shaping their leadership styles to adopt sustainability practices in construction projects, which is critical to achieving the SDGs and net-zero targets by 2050. Developing leadership competencies is not an easy feat. Organisations should implement various leadership training programs, including delegating leadership responsibilities [158] and workplace training [159]. Training and education play critical roles in developing leadership competencies in construction managers [159]. Project-based organisations should arrange training programmes for construction project managers with the aim of crafting their leadership styles that match organisational values and modifying these styles to align with the projects' needs [102]. Organisations can arrange continuous professional development for project leaders [160,161]. Targeted training can also be launched based on the project professionals' levels and the projects' sizes (Abdullah et al., 2018). The human resources management of construction organisations need to take initiatives to create objectives schemes [162]. To improve the vision and creative thinking of project leaders, construction organisations can organise analytical activities, brainstorming sessions, and logical thinking activities [163]. This research also lays the foundation for further research in leadership in sustainable construction projects.

Supplementary Materials: The following supporting information can be downloaded at: https: //www.mdpi.com/article/10.3390/su16030971/s1, Table S1: List of reviewed articles; Table S2: The PRISMA 2020 checklist. **Author Contributions:** Conceptualization, F.A. and R.J.T.; methodology, R.J.T.; software, R.J.T.; validation, F.A. and R.J.T.; formal analysis, R.J.T.; investigation, R.J.T.; resources, R.J.T.; data curation, R.J.T.; writing—original draft preparation, R.J.T.; writing—review and editing, F.A.; visualization, R.J.T.; supervision, F.A.; project administration, F.A. All authors have read and agreed to the published version of the manuscript.

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