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CARBON FOOTPRINT REDUCTION IN PROJECT MANAGEMENT: STRATEGIES AND TOOLS

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Abstract

This research plan and proposal is to investigate ways and means of ensuring low carbon footprints within project management and how this will help to utilise sustainability standards from a global perspective to improve productivity and environmental standards worldwide. Using a literature review and case analysis methodology, the study captures best practices like early implementation of sustainability targets in project chartering, the use if virtual tools to minimise emissions, and the utilization of adequate energy efficient technological tools. Carbon footprint calculators and IoT-driven devices were evaluated in terms of effectiveness of resource tracking and adjustments in real time. This study brings out some of the positives of the approaches, such as the cost implications, compliance with the laws, and trust that is created with the stakeholders. This research underscores the need to decentralise sustainability into organisational culture and project environment, where constant oversight and engagement of key stakeholders are critical. Therefore, addressing carbon issues in project management is identified as the key effective strategy in attaining organisational environmental, economic and social goals for sustainable long-term operation.

***Keywords:** Carbon footprint, project management, sustainability, energy-efficient technologies, IoT-driven, resource tracking organisational culture, project environment.*

I. INTRODUCTION

One of the earliest proposals for a concept known as a "carbon footprint" came from[1]. A person's ecological footprint is the total area of biologically productive land and water required to sustain that person's lifestyle, expressed in world hectares. According to this model, a person's "carbon footprint" is the total area of land that would have to be covered in order to soak up all the CO_2 that they emit in a lifetime. The concept of carbon footprint eventually gained traction on its own, albeit in a slightly altered form, as the global warming crisis occupied a greater portion of the international environmental agenda. Carbon footprinting is not a new idea; it has been around for a while, but it goes by a different name: the indicator of global warming potential based on life cycle impacts. The current carbon footprint, which is a combination of the terms "ecological footprint" and "carbon footprint," is thus conceptually an indicator of the potential for global warming [2]. Despite the current buzz surrounding the topic, very few research actually provide carbon footprints in global hectares [3]. The public views it favourably as a metric for evaluating an entity's impact on climate change, but there are also some misconceptions about what it actually means [2], [4], [5]. Additionally, it has been noted that there is a lack of scholarly literature on the topic and that private organisations and enterprises have primarily conducted studies out of a sense of profit rather than environmental responsibility [4], [6]. The literature uses a variety of terms that are either synonymous with or used in conjunction with carbon footprint, including embodied carbon, embedded carbon, virtual carbon, carbon fluxes, climate footprint, and greenhouse gas footprint. [4], [5], [7], [8] The studies and literature that do exist on the topic of carbon footprint definitions are not very consistent. According to research by [4] A "carbon footprint" is the total amount of carbon dioxide that an activity or product releases into the atmosphere over the course of its whole life cycle. A new term dubbed a "climate footprint" might be used to indicate greenhouse gas emissions if all internal emissions could be detected. But new research and methodologies for calculating carbon footprints imply that additional GHGs should be considered as well, not just [3], [8], [9], [10], [11]. Despite growing awareness and global initiatives to curb emissions, the adoption of carbon footprint reduction strategies within project management remains inconsistent and underexplored. Incorporating such strategies not only aligns with international sustainability goals but also enhances operational efficiency, stakeholder trust, and regulatory compliance.

The goal of this study is to explore and propose effective tools, strategies, and technologies for reducing the carbon footprint within project management. It seeks to highlight how sustainable practices, such as energy-efficient technologies, virtual collaboration, and IoT-driven monitoring, can be included in project management procedures to accomplish sustainability objectives in areas of the society, economy, and environment. Additionally, the study examines the role of stakeholder collaboration, policy advocacy, and continuous improvement in fostering sustainability and aligning project management practices with global environmental standards.

II. STRUCTURE OF STUDY

This study is structured to offer a inclusive understanding of carbon footprint reduction in project management. It begins with an introduction to the concept of carbon footprints, tracing their origin and relevance to environmental sustainability. The subsequent section explores the importance of addressing carbon emissions in project management, followed by strategies such as sustainable planning, virtual collaboration, and green procurement. Tools and technologies, including IoT devices, carbon calculators, and energy-efficient solutions, are then discussed. A detailed literature review highlights existing research, while the discussion and conclusion synthesise findings, emphasising practical recommendations for achieving sustainability goals through effective carbon footprint management.

III. UNDERSTANDING CARBON FOOTPRINT IN PROJECT MANAGEMENT

Carbon footprint management aims to reduce emissions of carbon dioxide in order to mitigate the impact of human-caused climate change. The majority of nations are making tremendous efforts to

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cut down on industrial energy and carbon emissions by instituting programs and policies that will help different groups see the monetary, ecological, and social advantages of doing so. Research such as "Low carbon urban development strategy"[12]. has demonstrated these nations' efforts, additionally, according to [13]. UK's "Climate Change Act of 2008" sets a target of 80% reduction in GHG emissions from 1990 levels by 2020. In spite of this, the sector's adoption of carbon management policies and practices has been somewhat sluggish, and new approaches are required if the industry is to meet its emission reduction goals.

An indicator of the extent to which people alter Earth's natural systems is the carbon footprint; it is from this concept that the carbon footprint is derived. Here is a consistent method for contrasting the need for natural capital with Earth's ability to regenerate its ecosystems. To meet the resource needs of a human population and absorb their waste products, a certain amount of biologically productive land and water must be available. This evaluation can be used to determine the amount of Earth (or planets) needed to sustain a specific lifestyle if all humans adhered to it.

Unfortunately, there is currently no precise and generally acknowledged definition of a carbon footprint. There is, however, the concept of what a footprint actually is. An idea that has gained a lot of traction was put forth by Wiedmann (2007) [14]: the carbon footprint is the sum of all the carbon dioxide emissions that an activity or product produces, whether those emissions are directly or indirectly created or accumulate over time. Alternatively, CO2 emissions are quantified by the carbon footprint [14], [15].

By embedding carbon footprint management into project planning and execution, organisations can reduce their environmental impact, comply with regulatory standards, and align with stakeholder expectations. Furthermore, addressing carbon emissions contributes to broader corporate social responsibility (CSR) goals, creating long-term value for both businesses and society.

IV. STRATEGIES FOR REDUCING CARBON FOOTPRINT

Reducing the carbon footprint within project management includes strategic planning, efficient resource utilisation, and fostering sustainability throughout the project lifecycle [16].

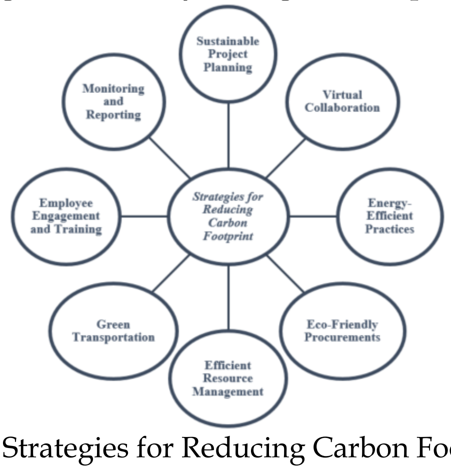

Fig. 1. Strategies for Reducing Carbon Footprint

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Below are key strategies:

- **Sustainable Project Planning:** Incorporate sustainability goals in project scope and objectives and a carbon footprint analysis to identify high-impact areas and implement measures to minimise emissions [17].
- **Virtual Collaboration:** Minimize travel by leveraging technology for virtual meetings, webinars, and cloud-based collaboration tools [18]. This reduces emissions from transportation and accommodates remote work.
- **Energy-Efficient Practices:** Choose energy-efficient equipment and renewable energy sources for project operations [19]. Optimise office spaces with LED lighting, energy-efficient HVAC systems, and smart energy management solutions.
- **Eco-Friendly Procurements**: Source materials locally to reduce transportation emissions and prioritise suppliers committed to sustainability [20]. Use recycled or sustainable materials and minimise packaging waste.
- **Efficient Resource Management**: Avoid overproduction by carefully planning resource use. Implement waste reduction strategies, including recycling and reuse of materials during project execution [21].
- **Green Transportation:** Encourage the use of public transport, carpooling, or electric vehicles for on-site project activities [22]. Alternatively, select project sites accessible via sustainable transport options.
- **Employee Engagement and Training**: Foster a culture of sustainability through training and workshops for the project team. Encourage innovative ideas to reduce the project's environmental impact.
- **Monitoring and Reporting:** Track the project's carbon emissions using tools or software. Regularly report progress on carbon reduction goals to stakeholders and use insights for continuous improvement [23].

V. TOOLS AND TECHNOLOGIES FOR CARBON FOOTPRINT REDUCTION

Leveraging modern tools and technologies is essential for reducing carbon footprints in project management. These solutions enable better planning, monitoring, and execution of sustainable practices throughout the project lifecycle.

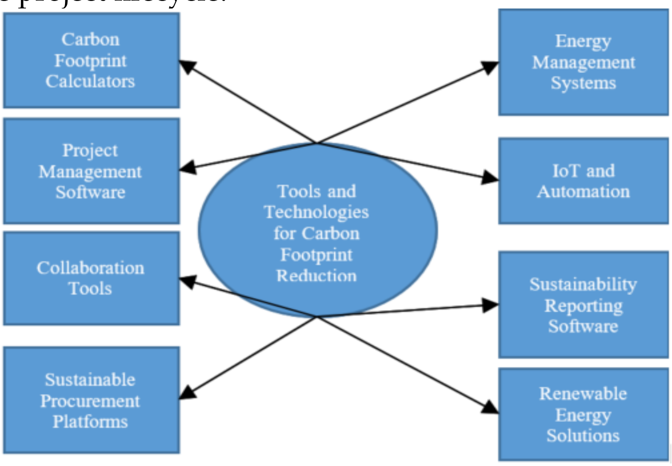

Fig. 2. Tools and Technologies for Carbon Footprint Reduction

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The major tools and techniques related to carbon footprint reduction are as follows:

- **Carbon Footprint Calculators:** Tools such as Simapro, Carbon Trust, and CoolClimate help quantify a project's carbon emissions [24]. These tools provide detailed insights into the sources of emissions, enabling targeted reduction strategies.
- **Project Management Software**: Project management software and online tools like Asana, Trello, and Microsoft Project make teamwork easier and faster, reducing the need for physical meetings and travel. Features like resource optimisation and task scheduling minimise unnecessary energy consumption [25].
- **Collaboration Tools:** Cloud-based platforms such as Slack, Zoom, and Google Workspace support remote work and virtual meetings [26], significantly cutting emissions from commuting and business travel.
- **Sustainable Procurement Platforms**: Tools like EcoVadis and Sustainable Supply Chain assess supplier sustainability practices. These platforms ensure eco-friendly procurement by prioritising vendors with low-carbon products and services [27].
- **Energy Management Systems**: Technologies like Energy Star Portfolio Manager and BuildingIQ monitor and optimise energy usage in project facilities, reducing overall consumption and emissions.
- **IoT and Automation**: Energy consumption and emissions can be tracked in real-time with the help of "Internet of Things" (IoT) devices such smart sensors. Automation tools optimise operations, reduce waste, and enhance efficiency [26].
- **Sustainability Reporting Software:** Tools such as Enablon and EcoChain help track and report carbon reduction progress. These platforms provide analytics and dashboards to align projects with sustainability goals.[28]
- **Renewable Energy Solutions:** Incorporate technologies like solar panels, wind turbines, or hybrid systems to power project operations, reducing reliance on fossil fuels [29].

VI. EFFECTIVENESS OF CARBON FOOTPRINT REDUCTION IN PROJECT MANAGEMENT

Reducing the carbon footprint in project management has proven highly effective in promoting sustainability, cutting costs, and aligning with global environmental goals [30]. Integrating sustainable practices across project phases helps organisations meet compliance standards, enhance stakeholder trust, and contribute to long-term climate resilience [31].

One significant benefit is the reduction of operational costs. Implementing energy-efficient technologies, optimising resource allocation, and minimising waste reduce utility bills and material expenses [32]. Virtual collaboration tools significantly cut travel-related emissions while saving time and money. Additionally, using renewable energy sources and sustainable materials lowers dependency on finite resources, mitigating environmental impact [33].

Effective carbon footprint reduction enhances the project's reputation and fosters positive relationships with stakeholders [34]. Clients, investors, and regulators increasingly demand eco-conscious practices, and meeting these expectations can lead to competitive advantages. Furthermore, engaging employees in sustainability initiatives boost morale, innovation, and

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productivity.

Advanced tools and technologies amplify the effectiveness of these efforts. For instance, carbon tracking software provides real-time data, enabling project managers to identify emission hotspots and implement corrective actions promptly [35]. IoT devices and automation further optimise processes, ensuring consistent performance in emission reduction.

However, achieving effectiveness requires commitment and continuous improvement. Regular monitoring, employee training, and stakeholder collaboration are essential to maintain momentum and refine strategies [36] Additionally, aligning carbon reduction goals with broader organisational objectives ensures that these initiatives contribute to overall business success.

VII. LITERATURE REVIEW

Penz and Polsa (2018) There has been a change in corporate practices towards a stakeholder orientation concerning ecological sustainability, which is a part of CSR. Nevertheless, there was a dearth of studies examining the actions taken in response to these stakeholders or the factors that prompted them. Using a resource-based perspective and stakeholder theory as a framework, this study set out to discover what corporations are doing to cut down on emissions of greenhouse gases and how they are informing stakeholders about their efforts to build relationships with them. The findings informed business decisions by outlining the criteria for measuring and calculating a carbon footprint. A flexible pattern-matching method and sixteen semi-structured interviews were used to identify them in fourteen different companies. By categorising human actions as either green services and products, heating, construction, travel, or transportation, the study contributes to what is already known about ecological sustainability. It also demonstrates how businesses tailor their carbon footprint actions to various stakeholders to foster relationships with them [37].

Fenner et al. (2018) The majority of society's carbon footprint is attributable to emissions from built environment. The GHG Protocol, ISO/TS 14067, PAS2050, and Life-Cycle Carbon Emissions Assessment are all getting more traction in the heated discussion over climate change mitigation strategies. Nevertheless, there is a lot of variation in the methodology, boundaries, scope, and units of greenhouse gas emissions when it comes to carbon emission estimations. Ensure that greenhouse gas emissions from existing buildings are regularly and reliably measured, reported, and verified, there is no internationally recognised method. To back up the development of a standard strategy, this report describes the inconsistencies of most life-cycle carbon assessment studies and evaluates current approaches for carbon footprint accounting. The study's secondary objective is to disseminate state-of-the-art information regarding emissions produced by buildings throughout their whole lifespan. Following an exhaustive examination of the relevant literature, this study concludes that a transparent, easily available, and uniform methodology is required to evaluate the carbon emissions produced by structures. The research findings can also help in discussing and reaching realistic goals to lower carbon emissions [38].

Solís-Guzmán et al. (2018) Since they necessitate not only environmental knowledge but also specialised information about building methods and energy sources, current methods for certifying buildings' environmental impact fall short in their capacity to engage the broader population and increase social consciousness. This research, which is a by-product of the OERCO2 Erasmus + project, details an open-source web software that allows everyone, not just experts, to calculate an approximate carbon footprint for a home. They take a close look at how the tool operates, how it handles data, and how it calculates. This study uses the OERCO2 tool to examine the ten most prevalent building types in Spain during the past ten years. It then compares the results to the ranges established by other authors to assess the magnitude of the findings. The OERCO2 tool is trustworthy since it produces findings that are within the specified logical value ranges. In addition, normal users can assess a building's sustainability thanks to the interface's remarkable simplicity. They are currently researching to determine how to include it in "Building Information Modelling" (BIM) settings and other environmental certification systems [39].

Huisingh et al. (2015) The interconnectedness of climate change and its economic, environmental, social, and ethical ramifications is generally ac knowledge as the most significant set of challenges confronting human society today. It will have far-reaching, severe, and unevenly distributed consequences for decades. The main factor that causes climate change and global warming is the increase in carbon emissions, which are driven by human activities such as burning fossil fuels and cutting forests. The articles in this special volume mainly focus on technological innovations and policy interventions that have been implemented in various agricultural, industrial, and urban settings to increase energy efficiency and decrease carbon emissions. These interventions have been examined at various scales, from the most micro (firm or household) to the most macro (national or even global). Essays in this special issue assess geoengineering strategies and carbon capture and storage as viable substitutes for more conventional approaches to lowering carbon emissions. Given the risks and side effects of various geoengineering schemes, the high cost of carbon capture and storage, and the lack of clarity surrounding its internal and external aspects, the most direct and effective approach to reducing carbon emissions would be to increase energy efficiency and widely adopt systems that rely on renewable energy sources with low carbon emissions. As a result, they need to shift their social metabolism to become economically dependent on fossil fuels less or not at all. While there has been progress towards making the necessary adjustments to product design, manufacturing, and consumption, It will be quite some time before they reach their objective of little or no fossil-carbon production. For low-carbon product development and post-fossil carbon society acceleration, It is of the utmost importance to strategically design and execute timely climate policy interventions, including various carbon taxation/trading schemes [40].

De Wolf, Pomponi, and Moncaster (2017) Reducing buildings' embodied "carbon dioxide equivalent" (CO2e) is a crucial step in meeting national and international carbon reduction goals. The building industry is working on methods, databases, and tools to measure embodied CO_2 emissions and propose solutions on a global scale. Although the TC350 established criteria for the appraisal of environmental product declarations and building projects' sustainability, no universal agreement has been reached on the best way to put these criteria into action. With the use of a literature focus groups, analysis, and interviews with professionals in the area, this study measures the state of the art in the construction sector. The current methodology, tools, and datasets are examined, in addition to the incentives found in the existing standards, building rules, and benchmarks. To determine what is standing in the way of practical CO_2 reduction and measurement, they draw on a variety of data sources. Governments should enforce better data quality and back the creation of a clear and easy-to-understand approach, according to this report [41].

Pomponi and Moncaster (2016) The built environment is the most environmentally damaging industrial sector, and despite many initiatives, “International Energy Agency” predicts that emissions from buildings will more than double by 2050. Although operational energy efficiency is still a hot topic among academics, evaluating the built environment for embodied carbon to identify areas with the most potential for reduction or mitigation has received less attention. A thorough evaluation of the existing research has shown that this research seeks to address the following research question: how can they lessen the impact of "embodied carbon" (EC) in man-made structures? There have been 102 scholarly research that thoroughly covers the topics of life cycle assessment and embodied carbon mitigation and reduction. Through a meta-analysis of the available data, seventeen mitigation techniques were identified from the current literature and subsequently addressed. The findings indicate that a combination of mitigation strategies is required, as none of them appears capable of solving the problem on their own. Key components for a quicker shift to a low carbon-built environment include using materials with lower EC, improved design, increasing reuse of EC-intensive products, and stronger governmental drivers. Life cycle studies are grossly inadequate and myopic, as shown in the meta-analysis of 77 LCAs. Studies sometimes fail to account for affects that happen during the occupancy stage and the building's end of life since they solely focus on the manufacturing stage. These gaps must be filled in and more thorough and relevant evaluations must be pursued by the LCA research community [42].

This study, Gao, Liu and Wang (2014) analyses the processes and methodologies employed in investigations of different carbon footprints. Also, the strengths, shortcomings, similarities, and differences of several carbon footprint assessment standards were evaluated. They looked at the organisation's footprint and the product's carbon footprint, as well as their different aims, principles, research boundaries, calculating methodologies, and data selection processes. They compared the criteria for evaluating an organisation's carbon footprint (ISO14064) with those for evaluating a product's carbon footprint (PAS2050, TSQ0010, ISO14047, and Product and Supply Chain GHG Protocol). For organisations and products in particular, While researching carbon footprints and evaluation criteria, the most important things to keep in mind are choosing a GHG, adjusting system parameters, quantifying emissions, choosing a date, and handling individual emissions. Current evaluation standards have provided some guidance on these matters, but they still have room for improvement [43].

This study, Giurco and Petrie (2007) discovers a method for creating ideal futures for whole metal cycles that result in less environmental impact. Indicators for life-cycle effect evaluation are generated using dynamic material flow models in Visual Basic. These models aid in locating critical points in metal cycle when interventions are needed. In addition, this study pinpoints the value chain participants whose actions have an influence on environmental performance or have the power to do so. This data will be useful for assessing potential transition paths to lessen effect. In these possible futures, demand control tactics, more metal recycling, and cutting-edge technological developments all come together. A case study of the US copper cycle illustrates that innovative technology for basic processing of mined ore will not significantly contribute to

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achieving the 60% CO_2 reduction target by 2050. The mining of lower-grade ore will lead to an ever-increasing reliance on these technologies. This being the case, in order to still fulfil predicted demand, primary and secondary producers would need to work closely together to enhance recycling of old scrap from 18% to 80%. Another possible outcome achieves the CO2 objective with a mere 18% to 36% increase in recycling rates, all while concentrating on a 1% annual reduction in copper consumption. Taken as a whole, these point to the need to focus on the "metal-in-use" phase of the metal value chain for specific CO2 reductions. The method also draws attention to the fact that achieving CO2 reduction goals necessitates balancing several elements of environmental performance [44].

Table I. Compressions of Literature Review

Author	Aim	Findings	Conclusion
Penz and Polsa (2018)	To identify corporate activities aimed at reducing greenhouse gas emissions and examine how these activities are communicated to stakeholders.	The five sectors of heating, construction, travel, transportation, and green products/services were identified as contributing to the carbon footprint. Companies tailor actions for different stakeholders to build relationships.	Companies integrate sustainability in stakeholder relationships through specific carbon reduction actions. The study contributes to ecological sustainability literature and practices.
Fenner et al. (2018)	To review current methodologies for carbon footprint accounting in the built environment and address inconsistencies in life-cycle carbon assessments.	Highlighted variations in boundaries, scope, and methodologies across studies. Indicated the importance of having an easily available, uniform, and standardised way to track and report building carbon emissions.	Standardised methods are essential to improve carbon footprint assessments and set meaningful targets for reducing carbon emissions in the built environment.
Solís-Guzmán et al. (2018)	To develop an open-source tool for estimating the carbon footprint of residential buildings accessible to non-specialized users.	The OERCO2 tool allows simplified carbon footprint estimation for non-experts. Its results are reliable, falling within logical ranges, and can potentially integrate with other certification tools and BIM environments.	Simplified tools like OERCO2 can enhance public engagement and awareness in assessing building sustainability. Further integration into other systems is recommended.
Huisingh et al. (2015)	To explore technical innovations and policy interventions for reducing carbon emissions across various sectors.	Identified energy efficiency and low-carbon renewable energy systems as the most effective approaches. Addressed uncertainties and risks in carbon capture/storage and geoengineering schemes.	Transitioning to low/no fossil-carbon economies requires systemic changes, effective policy design, and widespread adoption of renewable energy systems.
De Wolf et al. (2017)	To evaluate construction industry practices for measuring and reducing embodied CO2e and analyse barriers in implementing effective measures.	Reviewed tools, standards, and benchmarks, revealing gaps in data quality and practical application. Recommended government-mandated improved data quality and simplified methodologies.	Transparent and government-supported frameworks are necessary for effective measurement and reduction of embodied CO2e in construction projects.
Pomponi and Moncaster	To investigate strategies for mitigating and reducing embodied carbon	Identified 17 mitigation strategies, emphasising the need for a pluralistic approach. Highlighted gaps in life-	A comprehensive approach combining multiple strategies is essential to

(2016)	in the built environment.	cycle assessments, with most studies focusing only on manufacturing stages.	mitigate embodied carbon effectively. Improved LCA methodologies are needed for meaningful results.
Gao, Liu, and Wang (2014)	The goal is to examine product and company carbon footprint assessment metrics and practices.	Identified similarities, differences, and deficiencies in standards such as ISO14064 and PAS2050. Highlighted key aspects like GHG selection, data settings, and specific emission treatments.	Existing standards provide guidelines but require further improvements for effective and consistent carbon footprint assessments.
Giurco and Petrie (2007)	To design scenarios for reducing the carbon footprint in metal value chain, focusing on innovative technologies and demand management strategies.	Emphasised increased recycling and demand reduction as key pathways to achieve CO2 reduction targets. Emphasised the value chain's environmental performance trade-offs.	Recycling and demand reduction are critical to meeting CO2 targets. Trade-offs must be carefully managed to achieve meaningful reductions in environmental impacts.

VIII. DISCUSSION AND CONCLUSION

Carbon footprint mitigation measures and tools applied within project management present considerable prospects for the development of environmental responsibility and organisational performance improvement. This research brings deserving focal points to rightful, systematic, and effective ways of assessing, managing, and minimising emissions across various project phases. Applications such as carbon calculators, IoT devices, and sustainability reporting offer better insights for decision-making due to information on emission sources and the areas that require the most attention. Sustainable procurement and purchasing of renewable power sources play a crucial role to fit long long-term resource demands and climate goals and objectives. Moreover, the literature focuses on cuff collaboration among the stakeholders, policies and incentives, and the lifecycle assessment to guarantee the effectiveness of carbon reduction strategy. Despite such practices being adopted by organisations, difficulties are still felt in defining them and developing assessment methods and practices that are lined up to offer a globally standardised result.

Applying climate change concepts to project management reveal that carbon footprint elimination is vital in managing climate change impacts to attain sustainable development goals. Thus, through practices like virtual work, energy conservation, as well as environmentally friendly supply chain management, organisations can cut emissions substantially more effectively than through expensive carbon-neutral project initiatives and be rewarded with increased financial and reputational gains. The results show that technology supports these initiatives, adding efficiency and valuable information. Such measures can be helpful to organisations because they will be able to work in compliance with the regulations set within the environment, increase stakeholder confidence, and achieve competitive advantage. Yet, they seem to be understudied, and their dissemination remains relatively limited across the different sectors, providing a subject for future study and development. Hence, the implication of these initiatives goes beyond environmental gains but fosters economic and social cohesiveness in the face of global shocks.

Based on these findings, the recommendations are as follows:

- **Adopt Advanced Tools and Technologies**: It is recommended that organisations should adopt the carbon tracking software, IoT devices, and renewable energy in reduction of carbon emissions.
- **Enhance Stakeholder Collaboration:** Develop working relationships with suppliers, customers and governmental agencies to manage sustainable practices integration along the supply chain.
- **Regular Training and Awareness:** Organize awareness and sensitivity raising of its employees on sustainability and encourage the development of creative solutions to the problem of carbon emissions.
- **Policy Advocacy and Standardization**: Encourage the adoption of best practices with respect to the various approaches to determine carbon footprint for various products.
- **Continuous Monitoring and Improvement**: Hire bureaucracies to provide regular check of carbon reduction policies to determine their efficiency and where best they can be adjusted to address emerging environmental issues.

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