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Climate Change Mitigation and Adaptation in Ghana: Strategies and Challenges Faced by Social Enterprises

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Abstract: This research examined how social enterprises mitigate and adapt to climate change in Ghana, examining their strategies and challenges. The study adopted a descriptive research design and involved 379 social enterprises. Questionnaires were administered online, and data were analysed using descriptive statistics and a mean value ranking analysis. The findings revealed that the key strategies employed in climate change mitigation and adaptation include creating new funding models, promoting sustainable agriculture and food systems, forming strategic partnerships and networks, and implementing community-based renewable energy systems. The significant challenges in addressing climate change include competition from large organisations, cultural perspectives towards climate change, policy volatility, and lack of adequate technical skills. Hence, the study recommends developing specialised funding programmes for climate-focused social enterprises, climate change education and awareness campaigns, and capacity building to upgrade technical competencies in clean technologies and climate resilience design.

Keywords: social entrepreneurship; climate change; mitigation; adaptation; Ghana

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1. Introduction

Climate change remains a significant threat to human beings, the economy, and society's social structures. Global climate studies reveal that 2100 people in different territories may experience several climate threats simultaneously that could result in societal collapse [1,2]. As highlighted by the Intergovernmental Panel on Climate Change (IPCC) it reports that there is a need for society-wide shifts to reduce emissions of greenhouse gases and limit climate change consequences [3]. Whereas traditionally, governments and multilateral agencies have been critical in initiating climate change initiatives, there is increasing awareness of the potential for social entrepreneurship to bring novel solutions [4].

Social entrepreneurship is defined as using entrepreneurship to solve social and environmental issues, primarily focusing on the impact on society rather than profit [5]. Social entrepreneurs are crucial change agents to fight climate change and drive sustainable development through innovative technologies, business models, and approaches. They create ecological innovations in cleantech [6] and apply ICT tools to address social issues [7]. Social entrepreneurship meets sustainable development since it combines reducing poverty levels and environmental conservation [8], especially in developing nations. For instance, social enterprises are credited for introducing off-grid solar systems and clean cookstoves for low-income consumers [9]. Some stakeholders focus on enhancing energy conservation, transport, waste management, and the conservation of ecosystems [10].

Social entrepreneurship can foster climate action in the following ways: First, social entrepreneurs can be intimately connected with the communities they represent and understand the context of the problems in those communities [11]. Second, they are ready to take calculated risks and try new solutions, which is crucial for developing innovation

in the context of challenges such as climate change [12]. Third, social entrepreneurs can mobilise markets and engage with various actors, ensuring the replicability and longevity of intervention [13,14].

As much as social entrepreneurs have realised the importance of combating climate change, they encounter several challenges. Some are operational difficulties, management conflicts, inadequate regulations for resource acquisition, and transparency concerns, which are complex and uncertain [15]. To address these challenges, governments, investors, and civil society must promote an environment supporting social entrepreneurship [16]. These include enhancing institutional involvement through collaborations in governance and co-governance [17], policy entrepreneurship to advance sustainable development goals, and utilising social capital to access resources and power [18].

However, there is increasing literature on the effectiveness of social entrepreneurship in combating climate change. Empirical evidence has shown that social businesses can reduce emissions, improve adaptive capacity, and advance sustainable development at different scales [19,20]. Given the current state of affairs and the pressing need to address climate change, fostering social entrepreneurship will make the global shift towards a low-carbon green economy possible. However, in the Ghanaian context, little is known about its application and relevance among social enterprises. This research addresses this gap by exploring the mitigation and adaptation strategies social entrepreneurs employ in Ghana and the challenges that hinder social enterprises from responding to climate change. The study sought to answer the following research questions:

- RQ1: What are the key climate change mitigation and adaptation strategies employed by social enterprises in Ghana?
- RQ2: What challenges do social enterprises face in addressing climate change?

This research contributes to generating knowledge on practise, policy, and research in social entrepreneurship and climate change in Ghana and serves as a roadmap for other developing countries. As for practise, the research will help identify Ghana's significant initiatives and effective practises of climate-related social enterprises. As such, these findings can help other social enterprises and organisations interested in designing suitable interventions to address and respond to climate change in comparable settings. From a policy perspective, this study will reveal the challenges that social enterprises experience in combating climate change and possible ways of overcoming them. From this evidence, policymakers in Ghana and other developing countries can identify ways of supporting social entrepreneurship for climate action.

This article is structured as follows: Section 2 provides a comprehensive literature review covering the theoretical underpinnings of the study and a conceptual review of climate change and climate-focused social enterprises. Finally, an empirical review of past and related studies addresses the strategies and challenges to mitigate and adapt to climate change. Section 3 describes the methods used in this study. Section 4 presents the results of the study. Section 5 discusses the study's findings, presents recommendations and limitations, and provides suggestions for future research. Finally, Section 6 concludes the article by summarising the key findings.

2. Literature Review

This section presents a comprehensive review of literature relevant to the study. The review is structured in three main sections: First, the theoretical framework establishes the foundational theories underpinning the research. Second, the conceptual review examines and clarifies key concepts central to the study's focus. Third, the empirical review synthesizes previous research findings pertinent to the research questions, highlighting both consistencies and gaps in current knowledge (Figure 1).

2.1. Theoretical Framework

Ecological Modernisation Theory (EMT)

The theoretical framework underpinning this study is Ecological Modernization Theory (EMT), which posits that environmental sustainability and economic growth are not mutually exclusive but can be achieved through technological innovation, policy reform, and the active participation of social actors, including businesses and enterprises [21]. Emerging in the 1980s, EMT posits that sustainable economic growth and environmental conservation are harmonious and even synergistic [22].

In other words, EMT assumes that environmental issues can be resolved by continued technological progress and the extension of the process of industrialisation [23]. The theory is based on eco-innovation, market instruments, and environmental policy integration for sustainable development [24].

New trends in EMT have increased its applicability to global environmental concerns, such as climate change. According to Schlosberg and Rinfret [25], EMT can be used to analyse climate change governance, focusing on technological fixes and market mechanisms such as carbon pricing.

EMT has also added social aspects as a part of its later developments. Gibbs [24] states that the ecological modernisation theory comprises social learning and institutional reflexivity. This aligns with the call for social enterprises to combat environmental issues.

Some authors contend that EMTs may be overly optimistic about the ability of current institutions to address environmental challenges [26]. However, supporters have argued that EMT offers an effective strategy for managing the environment in the context of capitalist systems [27].

In a similar work, Teixeira [28] extends the EMT to the circular economy concept, indicating its aptness for present-day sustainable practises. Consequently, the application of EMT in this research provides an understanding of how social enterprises participate in the processes of ecological modernisation regarding climate change prevention and response and what obstacles they encounter in trying to balance their economic and environmental goals.

2.2. Conceptual Review

2.2.1. Climate Change

Climate change has become one of the most discussed issues of the present age, defined as a long-term alteration of a planetary or regional climate caused explicitly by the increase in greenhouse gases in the atmosphere due to human activities [29]. Fossil fuel dependency and deforestation are the leading causes of global warming that significantly influence the earth's ecosystems, societies, and economy.

New studies have reinforced a scientific basis for anthropogenic climate change theories [30]. The Sixth Assessment Report of the IPCC stresses that many impacts of climate change will persist for centuries or millennia [31].

Climate change is present in several ways, such as global warming, rising sea levels, changes in the precipitation regime, and more intense and recurrent weather events [32]. Many of these changes pose acute threats to species extinction due to habitat and ecosystem disruption [33]. Furthermore, climate change significantly affects human health, food security, water supply, and economic resilience, especially in weaker populations and developing countries [34].

Climate change is no longer only an issue from the physical science aspect but also the socioeconomic aspect of both the mitigation and the impacts. This has resulted in the emergence of integrated assessment models that involve physical climatology and economic and social systems to simulate scenarios and help in policymaking [35]. Furthermore, climate justice has emerged, drawing attention to the role of climate change in affecting vulnerable groups and the moral dimensions of climate change interventions [36].

The issue of climate change is complex, calling for mitigation measures that seek to reduce greenhouse gas emissions and adaptation measures that look at ways of dealing

with climate change impacts. The Paris Agreement, adopted in 2015, represents a global commitment to limit warming to well below 2 °C above pre-industrial levels, with efforts to limit it to 1.5 °C [37]. Nonetheless, the current pledges and policies are insufficient to achieve these goals, thus highlighting the need for more robust action [38].

Climate change has also influenced change and innovation in so many sectors. Renewable energy technologies have been experiencing continuous improvement and deployment [39], whereas nature-based solutions are increasingly acknowledged as solutions for climate change and biodiversity loss [40]. In addition, with the appearance of climate finance and green bonds, there are new ways to finance climate action [41].

2.2.2. Climate-Focused Social Enterprises

Climate social enterprises use business approaches to address climate change and its implications. These entities are defined by their ability to focus on climate change risks while ensuring financial viability [42].

One defining feature of climate-focused social enterprises is their creativity in designing and implementing climate solutions. They usually utilise technological innovations and innovative business strategies to deploy sustainable solutions like renewable energy, energy conservation, sustainable farming, and circular economy management [43]. For instance, most of these enterprises are involved in advancing and providing clean energy technologies in underserved societies, thus combining climate change mitigation with social inclusion [44].

Another essential feature is their focus on the local context and engagement with the community. Climate-focused social enterprises frequently design their solutions to tackle specific geographic and socioeconomic contexts, acknowledging that climate change cannot be addressed without considering the local contexts [45]. These organisations also demonstrate a high interest in impact measurement and transparency. Considering the current state of climate change, climate-focused social enterprises adopt rigorous approaches to measure and report their environmental performance, such as reducing carbon emissions or enhancing climate change resilience [46].

Another characteristic of climate-focused social enterprises is collaboration and networking. Some of these organisations actively look for collaboration with other stakeholders, including governments, NGOs, and private sector actors, given that climate change is a trans-sectoral issue [42]. Such partnerships are not limited to the national level, which is evidence of the global nature of climate change.

Lastly, climate-focused social enterprises are adaptable and resilient in their business models. As active players in the environment of climate policy and technological advancement, these organisations need to be flexible in their approaches. This can be seen in their governance structures, described as more fluid and adaptive than typical businesses or nonprofit entities [47].

2.3. Empirical Review

2.3.1. Key Strategies of Social Enterprises in Climate Change Mitigation and Adaptation

There has been a notable increase in the number of scholarly studies published on climate change mitigation and adaptation through the key strategies used by SEs in the past few years, showing the growing role of these organisations in tackling global environmental issues. This review aims to integrate the results of different empirical papers and provide the reader with a clear understanding of which approaches are more promising.

In their study, Puupponen et al. [48] analysed the climate change risks and adaptation strategies on farms and food processing firms in Finland. The data were collected through 27 thematic interviews conducted in 2012 and 2013. The study found that reactive adaptation strategies for building resilience include localising and decentralising food supply chains. Farmers prefer local food systems, and the public acceptance of climate policies depends on their economic impact. Strategic partnerships within food supply chain networks were identified as critical to increasing regional adaptive capacity and resilience. Therefore, the

findings suggest that social enterprises can adopt similar strategies, balancing climate goals with profitability, to mitigate and adapt to climate change successfully.

Wright et al. [49] conducted a literature review of corporate involvement in climate change, emphasising historical and modern corporate practises. The strategies include companies adopting green technologies and products, eco-efficiency measures, renewable energy use, and recognising the physical risks of climate change, such as hurricanes and floods, that can affect business operations and assets. This has involved company pledges to achieve "net-zero" emissions by 2050. Although the paper focuses on the fossil fuel industry regarding climate change, it is limited because it may not capture the contributions and strategies of other industries involved in carbon emissions and climate policy.

In another study, Venkataraman [50] highlighted the importance of social innovation in combating climate change. The paper also revealed the growing awareness of social innovation as a key element in addressing climate change. The paper argued that social entrepreneurs formulate policies developed from the top down and explicitly designed for them rather than entrepreneurship policies. This distinction in formulating policies was vital to facilitating social innovation concerning climate change.

Strategic partnerships and networks have been described as essential levers to achieve scale. Phillips et al. [51] undertook a systematic review of social innovation regarding climate change and identified that effective SEs collaborated with other sectors to access and share capital and knowledge. They found these partnerships to be most helpful in resolving complex and crosscutting climate issues.

Another emerging strategy is the creation of new funding models. Lehner and Nicholls [52] analysed social ventures using crowdfunding for renewable energy projects in Europe, thus providing insights into how these organisations can use digital technology to engage communities in supporting climate change initiatives.

2.3.2. Challenges Faced by Social Enterprises in Addressing Climate Change

Financial Constraints

Doherty et al. [42] established that the hybrid nature of social enterprises makes them financially constrained in their ability to source funding for climate initiatives. Likewise, a survey of 150 social enterprises across Europe by Richter [53] highlighted that funding is a significant challenge to scaling climate change solutions, with 73% of respondents complaining of inadequate funding. In a case study, Ramos-Mejía et al. [54] identified that Colombian social enterprises faced problems related to credit constraints and high interest rates that prevented them from investing in clean technologies and sustainability.

Regulatory and Policy Barriers

Another critical challenge is the legal framework that does not always provide sufficient or appropriate legal protection for social enterprises. Hillman et al. [55] argued that policy frameworks in 10 European countries highlighted the absence of legal forms for social enterprises as a problem in accessing particular funding and climate action support structures. Moreover, the volatility of climate policies can cause uncertainty for social enterprises. Some studies find that climate policy uncertainty (CPU) negatively influences green innovation and digital transformation in Chinese enterprises [56,57].

Market Challenges

The challenges that social enterprises experience include the inability to compete with well-established players in the climate solution market effectively. In a study of 200 social entrepreneurs in India, Goyal and Sergi [58] revealed a 62% response to the difficulty of scaling up climate-friendly products due to competition from larger firms.

Moreover, there is the issue of consumers' awareness and willingness to pay for greener products. Thompson et al. [59] conducted a mixed-methods study in the UK. They noted that despite consumer interest in environment-friendly products, consumers could not purchase products from social enterprises due to affordability.

Technological and Human Resource Limitations

Unfortunately, many social entrepreneurs lack the technical skills to design and execute sophisticated climate strategies. In a study by Creech et al. [43], which interviewed social entrepreneurs in Sub-Saharan Africa, the authors noted that lack of technology expertise was a significant factor limiting innovation in climate adaptation approaches.

Another area of concern is human resource constraints or limitations, which are considered formidable hurdles. Mair et al. [60] examined 300 social enterprises from different countries. They concluded that recruiting and retaining qualified employees is challenging for groups addressing complex climate problems that demand specific expertise.

Measurement and Impact Demonstration

It proved a challenge for social enterprises to demonstrate the effectiveness of their interventions in climate change mitigation and adaptation. Ormiston and Seymour [61] studied the impact reporting of 100 social entrepreneurial organisations. They argued that most had weak frameworks for measuring their environmental impacts, reducing the chances of attracting funders and supporters.

This challenge is made worse because climate change impacts are long-term in nature. In a study on US-based social enterprises, Lee and Jay [62] observed that the case studies highlighted the difficulties associated with showing short-term returns when it takes extended periods for climate change to manifest itself.

Institutional and Cultural Barriers

Organisational, legal, and cultural frameworks may also hinder social enterprises' climate actions. In a study on sustainable supply chain social enterprises, Bals and Tate [63] pointed out that entrenched business practises and resistance to change within partner organisations often hindered the implementation of climate-friendly innovations.

One of the cultural factors is cultural attitudes towards climate change itself. Comparing developed and developing countries, Haugh and Talwar [64] observed that social enterprises were more challenged with legitimacy issues in attaining community support when climate change scepticism was comparatively high.

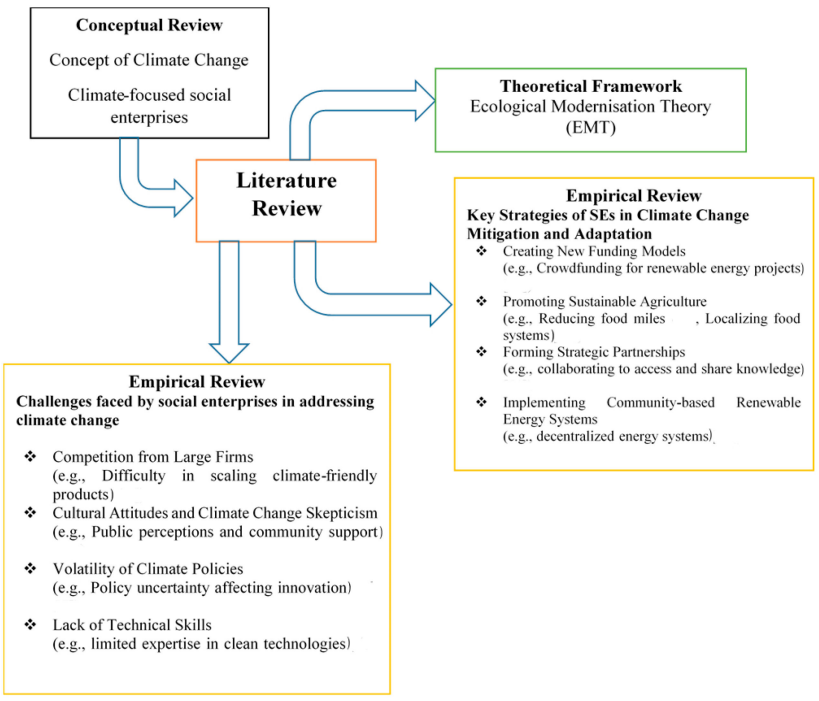

Figure 1. Literature review flow chart [43,48,49,51,52,56–58,60,64].

3. Materials and Methods

3.1. Research Design

The descriptive research design was adopted in this study, which was considered suitable for identifying the strategies and challenges of social enterprises combating climate change in Ghana. This design enabled describing the features of the phenomena of interest without controlling the variables [65]. This study was best conducted using a descriptive research design for the following reasons. First, it allowed the researchers to understand Ghana's current state of climate-focused social enterprises [66]. This is especially helpful given the evolving nature of social entrepreneurship concerning climate change mitigation and adaptation. In addition, the design enabled the data quantification of strategies and challenges for comparison and a statistical analysis [67]. This quantitative approach aligns with the study's objectives of comparing the efficacy of the different strategies and the prevalence of the various challenges. This is particularly valuable for ranking the effectiveness of different strategies and the prevalence of various challenges, directly addressing the research questions. In addition, descriptive research is beneficial for investigating relatively novel or less researched topics, such as climate-focused social enterprises in Ghana [68].

3.2. Study Population

Social enterprises are generally understood as organisations applying business solutions for social or environmental purposes [69]. Concerning this context, the population for this study comprised organisations engaged in both business and climate change mitigation, such as GHG emission reduction, renewable energy, climate resilience, and/or sustainable practises. Almost 28,000 social enterprises are functioning in Ghana [70].

3.3. Sampling Technique and Sample Size

The research adopted both purposive and snowball sampling techniques while selecting the respondents for the study. Purposive sampling enabled the researchers to select respondents who fulfilled specific criteria relevant to the study [71]. Here, the requirements included organisations that are individuals in social enterprises whose operations are centred on climate change mitigation or adaptation in Ghana. This technique is beneficial when working with a specific population that cannot be readily selected randomly [72]. After the initial purposeful sampling, the snowball sampling technique was used to obtain the final sample size. This approach entailed having the first respondents refer to eligible organisations that meet the inclusion criteria, thus producing a network effect [73]. Combining these techniques ensured a more comprehensive coverage of Ghana's diverse landscape of climate-focused social enterprises. However, it is crucial to acknowledge potential bias in this approach, mitigated by ensuring diverse starting points for purposive sampling and using multiple referral chains in snowball sampling [74].

Regarding sample size, with a population of 28,000 social enterprises, the sample size was determined to be 379 based on Krejcie and Morgan's [75] sample size determination table at a 95% confidence level and 5% margin of error. A sample size of 379 was sufficient to enable the statistical analysis and generalisation of the population [76]. It also handled any potential non-response and missing data, often in organisational studies [77].

3.4. Data Collection Procedure

The data collection process of this study on climate-focused social enterprises involved a structured online survey, which has gained popularity in past years in organisational research because of its convenience and feasibility of accessing participants located in different geographical areas [66]. The online survey method facilitated reaching a geographically diverse sample across Ghana, which is essential for capturing a representative view of social enterprises' climate change efforts nationwide. Given the large sample size (379 social enterprises), an online survey is a cost-effective and time-efficient method to collect data from a wide range of participants.

Respondents were recruited via snowballing from social enterprise networks, climate action forums, and databases of sustainable businesses. The first communication was an email containing the study's purpose, the estimated participation duration, and assurances of data confidentiality.

The study used Dillman's Tailored Design Method to ensure a high response rate, which involves sending invitation reminders and highlighting the importance of responding to the given questionnaires [78]. Follow-up emails were sent at an interval of 1 week, and data collection was performed between 4 and 6 weeks. There was strict adherence to ethical considerations in each stage of data collection. All respondents consented to participate in the study and were assured anonymity and data confidentiality. Their data were stored on a password-protected computer, as recommended by Harriss et al. [79], which was only accessible to the researchers.

3.5. Research Instrument

The online survey was developed using Google Forms, known for its features, such as providing a platform for complex survey designs and data security [80]. The survey is structured into four sections. The survey begins with a demographics section, collecting basic information about the respondents, such as age, gender, and education level.

The second section focuses on organisational information, gathering details about employee numbers, years of operation, and the specific area of climate change mitigation or adaptation the enterprise focuses on, such as renewable energy, sustainable agriculture, or waste management.

The third section delves into the core of the research, exploring the strategies these social enterprises employ for climate change mitigation and adaptation. Respondents were asked to rate the extent to which their organisations implement various strategies using a five-point Likert scale. This section was crucial for identifying the most prevalent and efficacious strategies used by social enterprises in addressing climate change.

The final section of the survey addresses the challenges these organisations face in their climate change efforts. Again, this section used a five-point Likert scale to explore various potential challenges, including financial constraints, policy volatility, market competition, and cultural attitudes.

3.6. Validity and Reliability

Validity, which refers to measurement accuracy, and reliability, which concerns the consistency of measurement, were achieved through several methodological approaches [81]. Content validity was established through a comprehensive literature review and expert consultation [82]. The survey items were developed based on existing social entrepreneurship and climate change mitigation research, ensuring that they adequately cover the domain of interest. A panel of social entrepreneurship and climate change research experts reviewed the instrument, providing feedback on the relevance and clarity of items, which were then refined accordingly [83]. Construct validity was addressed through pilot testing with a small sample of social enterprises similar to the target population [84].

Internal consistency was assessed using Cronbach's alpha coefficient for multi-item scales within the survey to enhance reliability, particularly for the strategy and challenge sections [85]. Table 1 below presents the Cronbach alpha value for the variables employed.

Table 1. Reliability Analysis.

Variable	Number of Items	Cronbach Alpha Value
Climate Change Mitigation and Adaptation Strategies	10	0.89
Challenges to Addressing Climate Change	12	0.87

Items on a questionnaire are considered statistically reliable if the Cronbach alpha values are higher than 0.7 [86]. Table 1 shows a Cronbach alpha value of 0.89 for the Strategies for Climate Change Mitigation and Adaptation scale, indicating excellent internal consistency. This value surpasses the standard alpha of 0.70, suggesting that the items in this scale are highly reliable and consistently measure the construct of climate change strategies employed by social enterprises.

In addition, the Cronbach alpha value of 0.87 for the Challenges to Addressing Climate Change scale also demonstrates strong internal consistency, well above the standard alpha of 0.70. This suggests that the scale is reliable for measuring the challenges faced by social enterprises in their climate change efforts.

3.7. Data Analysis

The analysis was conducted using statistical software, SPSS (Statistical Package for Social Science), version 26, an efficient tool for analysing quantitative data [87]. First, basic statistical measures were calculated to examine the general characteristics of the sample and significant variables. For continuous data, means and standard deviations of the variables were computed, and frequencies and percentages were calculated for demographic and organisational data.

A descriptive analysis involving calculating the means and standard deviation was determined to answer the research questions. Afterwards, the mean value ranking analysis was used to provide a clear and concise summary of respondents' assessments of climate change mitigation and adaptation strategies and the challenges social enterprises face in addressing climate change. This method facilitated the comparison of overall effectiveness and significance by simply averaging individual responses, which streamlined the analysis process.

Using mean values, the researchers determined which strategies received the highest or lowest levels of implementation and which challenges were perceived as the most or least significant. This approach allowed for identifying general trends and patterns in Ghana's practises and the challenges of climate-focused social enterprises.

3.8. Ethical Considerations

When carrying out the study, the following ethical issues were considered to ensure the participants' welfare and maintain the integrity of the research. The participants' informed consent was collected before the study, and they thoroughly explained and understood the study's objectives, methods, and possible consequences. This process was entirely voluntary, and nobody was forced or pressured to continue in the study if they did not wish to do so. To ensure confidentiality and anonymity, the responses given by the participants were kept confidential and could only be accessed by the research team. The researchers evaluated and controlled the psychological harm to participants and their possible adverse reactions. They were informed of the handling and sharing of their data, and the researchers respected the data by using it in the manner agreed upon in the informed consent. The researchers ensured that the participants' rights were respected, potential harm was minimised, and the research adhered to high ethical standards.

4. Results

This section presents the research findings and discusses them with the literature.

4.1. Demographic Information

Table 2 shows the demographic information of respondents who participated in the survey from 379 social enterprises in Ghana.

Table 2. Demographic Information.

Demographic		Frequency	Percentage
Age	Under 25	67	17.7
	25–34	70	18.5
	35–44	92	24.3
	45–54	68	17.9
	55 and above	82	21.6
Gender	Female	207	54.6
	Male	172	45.4
Education Level	Postgraduate	124	32.7
	Tertiary	125	33.0
	Secondary	105	27.7
	Primary	25	6.6
Job Position	Founder/Co-founder	24	6.3
	CEO	74	19.5
	Managing Director	108	28.5
	Senior Manager	124	32.7
	Project Manager	32	8.4
	Business Development Manager	7	1.8
	Other	10	2.6

The findings show an even age distribution, with those aged 35–44 years being the largest group at 24.3%, while those aged 55 years and above are 21.6%, and those from 25 to 54 years represent 18.5% of the respondents. Those aged 45–54 are represented by 17.9% of the respondents, and the least represented are those under 25 years, represented by 17.7%. Concerning gender distribution, there were more female respondents (54.6%) than male respondents (45.4%), but not a significant difference.

Most respondents had tertiary education (33.0%), followed by those with postgraduate education (32.7%). The third largest group (27.7%) had attained secondary education. Those with primary education were the least represented, comprising 6.6% of the respondents. The different education levels indicate that the study encompasses views from people with varying levels of education.

Senior Managers constitute the largest group of respondents, representing 32.7% of the sample. The second largest group comprises managing directors, with 28.5% of respondents. CEOs account for 19.5%, which increased the representation of the senior leadership perspective in the study. Founders or Co-founders make up 6.3% of the respondents. Project Managers constitute 8.4% of the sample, allowing for a ground-level perspective on implementing climate-related initiatives. It also includes a very small percentage of Business Development Managers (1.8%) and other positions (2.6%), which enriches the data collected. Generally, this distribution gives a reasonably good account of the population in terms of career life stages and career experience.

Regarding the organisation's structure as shown in Table 3, most of the organisations have 11–50 employees (27.3%), followed by organisations with 51–100 employees (21.1%). Enterprises with 1–10 and 101–250 employees constitute 19.0% and 20.1%, respectively, with mid-sized organisations (51–100 employees) making up 16.1% of the sample. This distribution implies that the study included a representative mix of small and large enterprises.

The sample includes a mix of newly established and well-established enterprises regarding operational longevity. The largest group (24.3%) has been operating for more than 10 years, indicating a significant presence of experienced organisations. However, there is also a substantial representation of newer enterprises, with 21.1% operating for less than a year and 19.5% for 1–3 years. Organisations operating for 4–6 years and 7–10 years comprise 18.5% and 16.9% of the sample, respectively.

The primary focus areas of these social enterprises are diverse, covering various aspects of climate change mitigation and adaptation. The most common focus is climate change adaptation, representing 21.1% of the sample. This is followed by renewable energy

(17.7%), energy efficiency and sustainable agriculture (both at 16.1%), waste management (15.0%), and sustainable transportation (13.5%). This distribution reflects a multi-faceted approach to addressing climate change issues in Ghana, with a slight emphasis on adaptation strategies.

Table 3. Organisational Information.

Variable		Frequency	Percentage
Number of Employees	1–10	72	19.0
	101–250	76	20.1
	11–50	90	27.3
	51–100	80	21.1
	More than 250	61	16.1
Years of Operation	1–3 years	80	21.1
	4–6 years	74	19.5
	7–10 years	70	18.5
	Less than 1 year	64	16.9
	More than 10 years	92	24.3
Primary Focus	Climate change adaptation	80	21.1
	Energy efficiency	61	16.1
	Renewable energy	67	17.7
	Sustainable agriculture	61	16.1
	Sustainable transportation	51	13.5
	Waste management	57	15.0

4.2. Descriptive Statistics

4.2.1. Strategies of Social Enterprises That Successfully Contribute to Climate Change Mitigation and Adaptation

To answer the first research question, respondents were asked to rate the extent to which their organisation employs climate change mitigation and adaptation strategies. The findings are shown in Table 4 below:

Table 4. Strategies of social enterprises that successfully contribute to climate change mitigation and adaptation.

Statements	Mean	Std. Dev.	Rank
Implementing new clean energy technologies (e.g., solar energy).	3.40	1.109	9th
Promoting nature-based solutions (e.g., ecosystem restoration).	3.45	1.058	5th
Implementing circular economy principles (e.g., upcycling, recycling).	3.44	1.146	7th
Forming strategic partnerships and networks.	3.52	1.166	3rd
Creating new funding models (e.g., crowdfunding for renewable energy projects).	3.54	1.094	1st
Increasing education and awareness-raising activities.	3.45	1.151	5th
Implementing community-based renewable energy systems.	3.49	1.138	4th
Promoting sustainable agriculture and food systems.	3.54	1.118	1st
Implementing waste management and waste-to-energy solutions.	3.32	1.123	10th
Developing sustainable transportation initiatives (e.g., bike sharing, car sharing).	3.41	1.105	8th

Source: Field Survey (2024).

As shown in Table 4, the most prominent strategies with the highest mean score are "Creating new funding models" and "Promoting sustainable agriculture and food systems". This indicates that innovative financing approaches and sustainable agricultural practises

are the top priorities for these organisations in addressing climate change. The third most crucial strategy is "Forming strategic partnerships and networks". This highlights the significance of collaboration and networking in the sector's climate change mitigation and adaptation approach.

"Implementing community-based renewable energy systems" ranks fourth, suggesting a strong focus on localised, sustainable energy solutions. This is closely followed by "Promoting nature-based solutions" and "Increasing education and awareness-raising activities", both tied for fifth place with a mean of 3.45. It is worth noting that more technical strategies such as "Implementing new clean energy technologies" and "Implementing waste management and waste-to-energy solutions" rank lower (9th and 10th, respectively), indicating that while these are still important, they are not as widely implemented as the top-ranked strategies.

The relatively high mean scores across all strategies (all above 3.45 on a 5-point scale) suggest that social enterprises in Ghana are employing a diverse range of approaches to address climate change, with a particular emphasis on innovative funding, sustainable agriculture, partnerships, and community-based solutions.

4.2.2. Challenges Faced by Social Enterprises in Addressing Climate Change

To answer the third research question, respondents were asked to rate their level of agreement with the factors that challenge their organisation's climate change efforts. The findings are shown in Table 5 below:

Table 5. Challenges faced by social enterprises in addressing climate change.

Statements	Mean	Std. Dev.	Rank
Limited access to funding.	3.11	1.124	7th
High interest rates for investments in clean technologies.	2.95	1.199	12th
Lack of appropriate legal forms for social enterprises.	3.16	1.129	5th
Volatility of climate policies.	3.19	1.208	3rd
Competition from larger, established firms.	3.22	1.189	1st
Low consumer willingness to pay for greener products.	3.10	1.207	9th
Lack of technical skills to design and execute climate strategies.	3.19	1.135	3rd
Difficulty in recruiting and retaining qualified employees.	3.14	1.208	6th
Challenges in measuring and demonstrating environmental impacts.	2.98	1.227	11th
Difficulty in showing short-term returns on climate change initiatives.	3.10	1.200	9th
Dominant logistics practises limiting climate innovation solutions.	3.11	1.175	7th
Cultural attitudes and climate change scepticism.	3.22	1.198	1st

Source: Field Survey (2024).

The most significant challenges, with the highest and equal mean scores, are "Competition from larger, established firms" and "Cultural attitudes and climate change scepticism". This indicates that these organisations' primary challenges in climate change efforts are market competition and societal perceptions. The third most pressing challenges are "Volatility of climate policies" and "Lack of technical skills to design and execute climate strategies". This highlights the dual challenges of an unstable policy environment and a skills gap in the sector.

"Lack of appropriate legal forms for social enterprises" ranks fifth, suggesting that the regulatory environment may not fully support these organisations. "Difficulty in recruiting and retaining qualified employees" is the sixth most significant challenge, indicating human resource challenges in the sector. It is noteworthy that financial challenges such as "Limited access to funding" and "High interest rates for investments in clean technologies" are not

among the top-ranked challenges (ranking 7th and 12th, respectively). This suggests that while financial challenges exist, they are not perceived as the most critical obstacles.

The relatively high mean scores across most challenges (majority above 3.00 on a 5-point scale) indicate that social enterprises in Ghana face multiple significant challenges in their climate change mitigation and adaptation efforts. The most pressing challenges are market competition, societal attitudes, policy instability, and technical capacity rather than direct financial constraints.

5. Discussion

5.1. Strategies of Social Enterprises That Successfully Contribute to Climate Change Mitigation and Adaptation

The findings on the strategies of social enterprises that successfully contribute to climate change mitigation and adaptation in Ghana reveal a diverse and multi-faceted approach to addressing climate change issues. The top-ranked strategy, creating new funding models and promoting sustainable agriculture and food systems, indicates that Ghana's social enterprises focus on innovative financing and sustainable food production as primary means of climate action.

These findings align with some of the strategies identified in empirical studies. For instance, the emphasis on new funding models is consistent with the work of Lehner and Nicholls [52], who analysed social ventures using crowdfunding for renewable energy projects in Europe. This suggests that innovative financing is a global trend in climate-focused social entrepreneurship, not limited to developed countries. The high ranking of sustainable agriculture aligns with Seyfang's [88] study on Community-Supported Agriculture in the UK, which found that social enterprise business models had 30% fewer food miles than conventional supply systems. This indicates that sustainable agriculture is a key strategy for climate change mitigation across different contexts.

Forming strategic partnerships and networks was identified as a key strategy in the Ghanaian context. This strongly corresponds with Phillips et al. [51], who identified that effective social enterprises collaborated with other sectors to access and share capital and knowledge, particularly for addressing complex climate issues. Implementing community-based renewable energy systems is also a key strategy that aligns with the findings of Hain et al. [89], who studied community-based renewable energy systems in Germany and the UK. They suggest that localised, community-oriented energy solutions are common across different geographical contexts.

However, there are some notable differences between this study and other studies. For instance, while implementing new clean energy technologies ranks relatively low (ninth) in the Ghanaian context, it was not the case in other studies like Warnecke and Houndonougbo's [90] study on solar energy in developing nations. This discrepancy might be due to differences in local contexts, resources, or priorities. Similarly, while promoting nature-based solutions was not ranked among the key strategies in the present study, it is presented as a significant strategy in the Chausson et al. [91] study, highlighting its importance in coastal and urban environments. This difference might reflect varying environmental priorities or challenges in different regions. Interestingly, implementing circular economy principles, which rank low in the present study, contradicts the findings of Lazarevic and Valve [92] and Goworek et al. [93]. This suggests that while circular economy principles are recognised, they may not be as prioritised in Ghana as in other regions.

5.2. Challenges Faced by Social Enterprises in Addressing Climate Change

The findings on the challenges faced by social enterprises in addressing climate change in Ghana reveal a complex landscape of challenges. The top-ranked challenges are 'Competition from larger, established firms' and 'Cultural attitudes and climate change scepticism', followed closely by 'Volatility of climate policies' and 'Lack of technical skills to design and execute climate strategies'.

Competition from larger firms is consistent with Goyal and Sergi's [58] study, which investigated 200 social entrepreneurs in India and found that 62% reported difficulty scaling up climate-friendly products due to competition from larger firms. This suggests that market competition is a significant challenge for climate-focused social enterprises across different geographical contexts.

The challenge of cultural attitudes and climate change scepticism in the present study aligns with Haugh and Talwar's [64] observations. They found that social enterprises faced more legitimacy and community support challenges when climate change scepticism was high. This highlights the importance of public perception and awareness in the success of climate-focused social enterprises. Moreover, the prominence of policy volatility as a challenge in the present study corresponds with Uzondu and Lele's [94] findings, where policy volatility created challenges for strategic planning and investment among social enterprises in the renewable energy sector.

The lack of technical skills identified as a challenge in addressing climate change echoes the findings of Creech et al. [43], who noted that lack of technology expertise was a significant factor limiting innovation in climate adaptation approaches among social entrepreneurs in Sub-Saharan Africa.

While financial constraints are often cited as a primary challenge in some studies (e.g., [42,53]), 'Limited access to funding' is not a challenge in the present study. This discrepancy might suggest that Ghanaian social enterprises have found ways to mitigate financial or more pressing challenges in their context. 'Lack of appropriate legal forms for social enterprises' identified as a significant challenge aligns with Hillman et al.'s [55] findings about the challenges posed by inadequate legal frameworks for social enterprises in European countries.

The difficulty in recruiting and retaining qualified employees corresponds with Mair et al.'s [60] findings about the challenges of attracting and retaining talent for addressing complex climate problems. While challenges in measuring and demonstrating environmental impacts rank relatively low in the present study, they are highlighted as significant challenges by Ormiston and Seymour [61], who note weak frameworks for measuring environmental impacts among social enterprises. Finally, low consumer willingness to pay for greener products aligns with Thompson et al.'s [59] findings about affordability issues for consumers of social enterprise products in the UK.

5.3. Limitations of the Study

The study's cross-sectional nature limits the study's capability to depict development trends in climate change mitigation and adaptation strategies and challenges confronting social enterprises in the long term. Another limitation of the study is the geographical focus on Ghana; hence, the results cannot be easily generalised to other settings, especially developed countries or those with different climatic conditions.

5.4. Suggestions for Further Studies

Future research should undertake a longitudinal analysis of climate-focused social enterprises in Ghana over an extended period. Through the longitudinal observation of these organisations, researchers can learn about the changes in their practises, the results of their climate change policies in the long run, and their flexibility to adapt to new environmental and social contexts.

Another potential area of inquiry is a cross-country comparison of climate-oriented social enterprises in African countries. By comparing enterprises in diverse settings, researchers can identify common trends and context-specific factors that shape the success of climate-oriented social enterprises.

5.5. Recommendations

Based on the findings, the following recommendations are proposed:

1. There is a need for specialised funding structures for climate-orientated social enterprises and policies regarding sustainable agricultural practises. This may entail developing green bonds, climate-focused impact investment funds, grants, taxation relief, and technical assistance schemes.
2. The Ministry of Education, the Environmental Protection Agency, and local NGOs need to design and provide climate change education and awareness programmes that should be implemented to counteract scepticism and increase understanding of the effects of climate change. This could entail using community structures and groups, adding climate change content in school lesson plans, and using local television and radio stations for outreach.
3. To support such initiatives, programmes should be developed by the Ghana Climate Innovation Centre in partnership with universities and other institutions like the United Nations Development Programme to increase social entrepreneurs' skill level to include clean energy technologies, circular economy, and climate-resilient designs.

6. Conclusions

The study provides insights into social enterprises' strategies and challenges in mitigating and adapting to climate change. Key strategies implemented by social enterprises in Ghana towards the fight against climate change include innovative funding, sustainable agriculture, partnerships, and community-based solutions.

Despite their efforts to combat climate change, they also face significant challenges noted to be competitive threats from prominent firms and cultural threats related to climate change, the volatility of policies, and the absence of technical skills. Overall, the findings indicate that fighting climate change through social entrepreneurship is not as simple as it may seem. Even though these enterprises produce significant positive impacts, they experience complex issues that demand more extensive assistance from the authorities, investors, and society.

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