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Sustainable Supply Chain Practices, AI Capability, and CSR as Drivers of Corporate Green Competitive Advantage.

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ABSTRACT

This study examined the impact of sustainable supply chain practices, artificial intelligence capability, and corporate social responsibility on green competitive advantage within organizations operating in the United Kingdom. A quantitative research design was adopted, and primary data were collected from a sample of 333 respondents using a structured questionnaire measured on a Likert scale. The analysis was conducted using RStudio, employing structural equation modeling to assess direct, mediating, and moderating relationships among the constructs. The findings indicated that sustainable supply chain practices, artificial intelligence capability, and corporate social responsibility significantly influenced both organizational sustainability culture and green competitive advantage. Organizational sustainability culture was found to play a significant mediating role, strengthening the link between strategic drivers and competitive outcomes. Furthermore, top management support and digital transformation readiness significantly moderated key relationships, enhancing the effectiveness of sustainability initiatives. The study provided empirical evidence supporting an integrated framework that combined technological, strategic, and social dimensions of sustainability. The findings contributed to a comprehensive understanding of how organizations in the United Kingdom achieved green competitive advantage through internal cultural alignment and innovation driven practices.

INTRODUCTION

The increasing emphasis on environmental sustainability within the United Kingdom has intensified the strategic importance of aligning corporate operations with green objectives. Organizations operating in the UK face mounting regulatory, institutional, and stakeholder pressures to incorporate environmentally responsible practices into their business models, particularly within supply chain activities (Siqin et al., 2026). Sustainable supply chain practices have therefore emerged as a critical

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mechanism for reducing environmental impact while maintaining operational efficiency and compliance with national sustainability targets (Cimino et al., 2024). However, despite strong policy advocacy and growing awareness, many UK based organizations encounter substantial challenges in effectively embedding sustainability across complex supply chain networks (Pan et al., 2025). These challenges are further exacerbated by the need to integrate advanced technological capabilities, such as artificial intelligence, to enhance resource efficiency and decision accuracy. At the same time, corporate social responsibility plays a significant role in shaping organizational commitment to ethical and environmental standards within the UK business environment (Kumar, 2023). The convergence of these elements creates a dynamic yet complex landscape in which organizations strive to achieve green competitive advantage. Consequently, it becomes imperative to systematically examine how sustainable supply chain practices, artificial intelligence capability, and corporate social responsibility collectively influence competitive positioning within the UK context (Barman & Sana, 2025).

The sustainability practices in the UK suffers from a fragmented understanding of the various drivers that shape how organisations achieve a green competitive advantage through their interactions. While previous research has demonstrated that sustainable supply chain practices, the capabilities of artificial intelligence, and corporate social responsibility are all individually significant at the organisational level, no integrated framework has been developed in the context of the UK marketplace to assess their collective impact (Abdolazimi et al., 2024). There are therefore considerable limitations in the comprehension of how these four drivers impact on organisations within the UK, particularly given the unique institutional environment of the UK characterized by strict environmental legislation, rapidly changing digital transformation objectives, and strong stakeholder pressure for responsible business practices (Wang & Ge, 2022). There is also a greater degree of uncertainty in terms of how the processes by which these drivers translate into competitive outcomes work internally, particularly in the context of how organisational culture with respect to sustainability such as shared values and practices regarding environmental responsibility mediates the effect of these drivers at the organisational level within UK firms (Tay et al., 2025). In addition, empirical studies have not adequately considered the contributions of contextual drivers, including top management support, innovation readiness to the processes by which drivers of organisational sustainability create a competitive advantage (Amoako et al., 2026). As such, the absence of a comprehensive framework for conducting analytical research constrains the understanding of how organisations in the UK can leverage sustainability-based strategies to create competitive advantage in our rapidly evolving business landscape.

The objective of this research is to develop and empirically evaluate an integrated framework that explains how sustainable supply chain practices, artificial intelligence capability, and corporate social responsibility drive green competitive advantage within the United Kingdom. The study specifically focuses on examining the mediating role of organizational sustainability culture in transforming these strategic drivers into enhanced organizational outcomes. Furthermore, the research incorporates top management support and digital transformation readiness as moderating variables, recognizing their critical influence in facilitating or constraining the implementation of sustainability initiatives in UK firms. The necessity of this investigation arises from the increasing complexity of balancing economic performance with environmental responsibility in the UK corporate landscape. Artificial intelligence capability enables organizations to optimize resource utilization and improve decision making processes, while corporate social responsibility enhances legitimacy and stakeholder trust in a highly regulated environment. By integrating these elements into a unified analytical framework, the study aims to provide a comprehensive understanding of how UK organizations can effectively align technological innovation, social responsibility, and sustainable practices. This approach addresses existing theoretical gaps and offers actionable insights for improving sustainability performance and competitive positioning.

This study's importance is due to the contribution both to academic literature and management practice concerning sustainable competitive strategy in the UK. The use of an organizational sustainability culture as the predominant mediating construct expands on the more traditional direct effect models and shows that companies must consider the alignment of their internal culture as a means of achieving sustainable results. Supporting this conclusion is evidence of how the combination of top management support for sustainability and the readiness for digital transformation as moderating variables provides for a broader perspective on the operational realities of UK organizations that are undergoing digital and environmental transformations. The uniqueness of this study is determined by its integrative framework that concurrently explores strategic practices, technological capabilities, and organizational conditions within one model. The overall comprehensive assessment delivered through a multidimensional perspective allows for a better understanding of how green competitive advantage can be achieved. From a practical standpoint, this study provides guidance to policymakers, corporate leaders and sustainability practitioners to develop effective strategies in alignment with regulatory requirements and market needs in the UK. Finally, this study provides a strong base for future research with a theoretical foundation and an empirically validated structure for investigating sustainability-oriented issues in and outside of the UK.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The sustainability of any organization achieved with the involvement of management and sustainable practices (Cui et al., 2026). In the modern organizational environment, the rule of sustainable practices is important in supply chain. Sustainable supply chain helps to utilize the resources appropriately according to the requirement of the organization (Yadav et al., 2024). These sustainable practices leads to achieve the green competitive advantage for the organization when the resources are fairly used. However, the training of management and employees to use sustainable supply chain practices and implement the framework of sustainability is necessary (Siqin et al., 2026). The goals of organization can be achieved for green development with the help of sustainable supply chain practices. Furthermore, the sustainable supply chain practices improve the organizational culture with advancement of resources utilization based on the requirement. These sustainable practices are helpful for development of comprehensive plan for supply chain for green advantage through the organization (Singh, 2024). The organizations focusing on sustainable supply chain works for fair use of resources and project planning that can help to achieve the green competitive advantage. Accordingly, the less focus of organizations on sustainable supply chain practices that reduce their grain competitive advantage and the culture of organizational sustainability (Jena & Meena, 2022). It is a helpful factor for supply chain practices advancement where the competitive advantage is considered as significant factor of development. Based on this discussion, the following hypotheses are proposed.

H1: Sustainable supply chain practices have a significant impact on organizational sustainability culture.

H2: Sustainable supply chain practices have a significant impact on green competitive advantage.

Corporate social responsibility is considered as the key factor for significant advancement of sustainable culture in the organization (Paksaz et al., 2024). Based on the mechanism of corporate social responsibility, the employees of different organizations work accordingly to focus on green competitive advantage. The organization testing ability helps the companies to focus on the social responsibility which is major focus of modern industries (Lv, 2025). The consumer centric sustainable working approach of the organization is also helpful to protect the environment and achieve grain competitive advantage. Accordingly, the corporate social responsibility is necessary factor for the organizations to achieve the goals of sustainable development (Guo et al., 2023). The modern organizations focus on green competitive advantage where the organizational sustainability and culture is considered as significant factor for getting competitive advantage in the market. The corporate social responsibility

also helps the organizations to focus on sustainable practices that can be attributed to protect the environment. The board of directors of these organizations are required to plan and implement vast framework for organizational sustainability culture (Rehman et al., 2024). Based on the following discussion, the following hypotheses are developed.

H3: Corporate social responsibility have a significant impact on organizational sustainability culture.
H4: Corporate social responsibility have a significant impact on green competitive advantage.

The capability of employees to use artificial intelligence in the modern time is helpful for saving the resources of the organization (Li et al., 2026). Artificial intelligence is helpful in decision making based on the data and reducing the cost of production and supply chain. The main role of artificial intelligence is to create the green impact for the organizations where the resources can be utilized in digital way and competitive advantage can be achieved (Chowdhury et al., 2026). The integration of AI in workspace can improve the advancement of business practices where sustainability goals can be aligned with its implication. Artificial intelligence is helpful for development of grain competitive advantage where the organizations lead to utilize artificial intelligence to save the resources and cost of the business (Basu et al., 2024). In the business as well as corporate sector, the role of artificial intelligence has become important where different organizational working can be performed in smart and suitable way (Ghouri et al., 2023). The artificial intelligence can improve the capability of business and develop the grain competitive advantage which focus on business development and transparency (Bai et al., 2022). The suitability of artificial intelligence can be improved according to the requirement of business operations and the willpower of top management to digitalize and make the smart business decisions. Based on the following discussion, the given below hypotheses are developed.

H5: Artificial intelligence capability have a significant impact on organizational sustainability culture.
H6: Artificial intelligence capability have a significant impact on green competitive advantage.

The sustainable development culture of the organization is important factor to contribute in achieving green competitive advantage (Rashid et al., 2025). The organizations working on sustainability goals can establish the sustainable development culture which is helpful to integrate the resources and output with sustainability framework. It is critical for the organizations to have sustainability related policies where the implementation of these policies with the help of government active sport can improve the organizational green development (Holgado et al., 2024). The green competitive advantage of the organization is important to be based on the sustainability culture in the management and integration of policies with the employees (Alma'abreh et al., 2026). The fair use of resources and green supply chain related sustainable culture of the organization advances the grain competitive advantage (Behl et al., 2024). The left behind organizations which focus less on green competitive advantage development, these organizations face critical issues in the establishment of green competitive advantage environment in the market. Based on the following discussion, the given below hypothesis is developed.

H7: Organizational sustainability culture have a significant impact on green competitive advantage.

The organizational sustainability is achieved when larger framework is according to achievement of sustainable development goals (Heriyati et al., 2024). Many organizations focus on advancement of supply chain for utilizing the resources in fairway which is aligned with sustainable development these sustainable development goals are critical for integration of organization and corporate social responsibility the help of green competitive advantage (Saha et al., 2025). This green competitive advantage help in artificial intelligence development capability where the green competitive advantage is utilized for sustainable working. The organizations focusing on sustainable supply chain develop organizational sustainability culture which is necessary to achieve green sustainability (Rajput, 2024). The corporate sector is required to put more emphasis on sustainable development and competitive advantage planning which is necessary for organization to grow and remain competitive . In the

business environment where supply chain is considered as a critical factor for artificial intelligence capability integration, the chances of green competitive advantage are high. This competitive advantage helps the organization to formulate their policies and regulate their missions according to sustainable development (Tseng et al., 2022). These organizations mainly focus on utilizing the resources in better way and efficient working of workforce. In addition to it, the integration of artificial intelligence with organizational sustainability goals can lead to grain competitive advantage development in the market. Based on the following discussion, the given below mediating hypotheses are developed.

H8: Organizational sustainability culture mediates between sustainable supply chain practices and green competitive advantage.
H9: Organizational sustainability culture mediates between corporate social responsibility and green competitive advantage.
H10: Organizational sustainability culture mediates between artificial intelligence capability and green competitive advantage.

The role of top management is important in organizational culture to integrate the policies and implement in successful way (Negri et al., 2024). The top management is considered as critical for advancement of supply chain where the fire resources are used with the intervention of these managements. Different bodies and layers of operations are performed in organization where the role of sustainability and supply chain practices is critical in advancement of development of competitive advantage (Kleinknecht, 2021). This critical competitive advantage becomes a success factor for businesses while working in the management support system where the corporate social responsibility is considered as a key goal (Jin et al., 2025). The advancement of business and artificial intelligence development can lead to business sustainability and organizational cultural advancement where the necessary factors for success are developed to support the business in the market. Meanwhile, the intervention of top management to regulate the framework of sustainability helps the organizations to advance their practices and management for sustainability (Barman & Sana, 2025). These practices guided by the top management are helpful for development of social responsibility culture in the organization. This culture leads to utilization of green resources and green practices implementation for achieving green performance (Cimino et al., 2024). Accordingly, the management also have a critical role in integration of artificial intelligence into the business networking and operations (Kshetri, 2021). These operations are useful for advancement of artificial intelligence integration and success factor for necessary business development. Based on the above discussion, the following moderating hypotheses are developed.

H11: Top management support moderates between sustainable supply chain practices and organizational sustainability culture.
H12: Top management support moderates between corporate social responsibility and organizational sustainability culture.
H13: Top management support moderates between artificial intelligence capability and organizational sustainability culture.

The digital transformation of businesses have a key impact on organizational sustainability and competitive advantage (Moktadir et al., 2021). This digital transformation improve the functionality of business with fair use of resources to go on digital platforms. These digital platforms are critical success factors for the development of competitive advantage and organizational sustainability (Khokhar et al., 2025). It is necessary factor for the organizations to develop digital transformation readiness mechanism which is integrated with artificial intelligence and sustainability oriented practices of the organization (Pan et al., 2025). This system is useful for advancing the competitive advantage against the competitors in the market. The integration of artificial intelligence in business development and digital transformation can advance the green competitive advantage and sustainability practices (Kumar, 2023). Based on these practices, the internal mechanism of the organizations work appropriately where

sustainability and gain competitive advantage are integrated and aligned for the same corporate social responsibility goals (Abdolazimi et al., 2024). Based on the above discussion, the following hypothesis is developed.

H14: Digital transformation readiness moderates between organizational sustainability and green competitive advantage.

The framework of this research is presented in Figure 1. This framework highlights that sustainable supply chain practices, corporate social responsibility and artificial intelligence capability are the independent variables. Furthermore, the framework highlight organizational sustainability culture is the mediating variable and Green's competitive advantage is the dependent variable. In addition, the framework of this study highlights that top management support and digital transformation readiness are the moderating variables in this research.

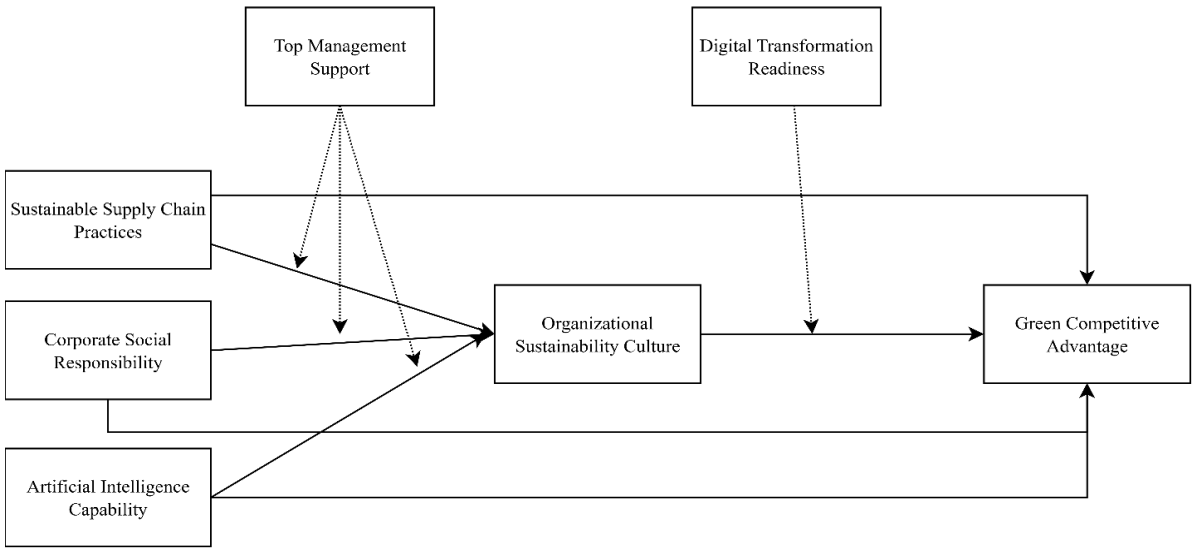


Figure 1: Theoretical Framework

MATERIAL AND METHODS

This study used the quantitative research method to investigate the relationship between research variable empirically. The quantitative approach is useful in the studies for testing the hypotheses and the relationship between variables and their strength with a structured theoretical framework (Sekaran et al., 2016). This study focused on primary data collected through structured questionnaire based on the items taken from previous studies and adapted according to the requirement of this research. This study used Likert scale instruments for measuring the variables and investigation of the relationship between the variables. The population of this research well based on the professionals working in organizations across United Kingdom that are mainly focusing on supply chain activities and sustainability initiatives. This study used this population due to their direct involvement with supply chain practices and operational processes for the sustainability of the supply chain and grain competitive advantage. This study collected cross-sectional data which is considered appropriate in non-probability sampling where the respondents have no chance of contacting again (Sekaran et al., 2016).

The instruments of this research were taken and adapted from the previous studies. The instruments to measure sustainable supply chain practices were adapted from existing studies (Lintukangas et al., 2015) to measure how the sustainability related supply chain practices have impact on organizational inability culture and green competitive advantage. The study also adapted the instrument from previous research to measure corporate social responsibility and its impact on

organizational sustainability culture and green competitive advantage (Chang, 2015). Regarding the artificial intelligence capability instruments, this study adapted the items from previous studies to measure how the capability to use artificial intelligence have impact on organizational sustainability and culture (Park et al., 2024). The study adapted the instrument for organizational sustainability culture from existing studies to measure how the sustainability culture work in the organization and have impact on grain competitive advantage (Fok et al., 2022). Accordingly, the study adapted the instrument regarding green competitive advantage from previous research to measure how it is impacted by different factors (Ahmed Mustafi et al., 2024). The instrument for moderating variables top management support and digital transformation readiness were also taken from the previous research to understand how they play as the role of external factors (Ahmed & Azmi bin Mohamed, 2017; Muehlburger et al., 2022).

The appropriate sampling strategy which was non probability method and purposive sampling was used to ensure the inclusion of the respondents that have appropriate knowledge and experience about the supply chain management. Based on the specialized nature of the variables of this research in the context of United Kingdom, the purpose of this sampling was appropriate to identify the respondents that are eligible to provide meaningful and informed responses on the questionnaire. However, the sample of this research was diverse as a total number of 400 questionnaires were distributed to collect the data. The method of data collection was face to face where a total number of 336 responses were collected back from the questionnaires distributed. The study conducted the preliminary test to investigate the missing values and outliers in the data. After handling the missing data and outliers, the study found 333 responses as valid to analyze the data. Regarding the analysis of data in this research, this study focused on RStudio that is a significant tool for robust analysis (Murad et al., 2025). The study investigated the demographic findings and provide the interpretation of these findings according to the context of this research.

RESUTLS AND FINDINGS

This study at first analyzed the demographic data regarding the age. According to the data, the age of 35 respondents were between 20 to 29 years, the age of 155 respondents were between 30 to 39 years and the 80 respondents were between 40 to 49 years. Furthermore, the 63 respondents were above 50 years. Moreover, the study found that 152 respondents in this research were male and 181 respondents were female. The study also found that 41 respondents had the education diploma, 183 had bachelor degree, 80 had master degree while 29 had doctorate or higher degree. Regarding the experience, the study found that 109 respondents had less than five years of experience, and 177 respondents had 5 to 10 years of experience. Meanwhile, the study also found that 47 respondents had more than 10 years of experience. The findings of demographics information about the respondents are reported in Table 1.

Table 1: Demographics

Variable	Level	Frequency	Percentage
Age	20–29 years	35	11%
	30–39 years	155	47%
	40–49 years	80	24%
	50 years and above	63	19%
Gender	Male	152	46%
	Female	181	54%
Education	Diploma	41	12%
	Bachelor's Degree	183	55%
	Master's Degree	80	24%
	Doctorate or higher	29	9%
Experience	Less than 5 years	109	33%
	5–10 years	177	53%

More than 10 years	47	14%

The study investigated the loadings of each indicator based on probability value. By using RStudio and component factor analysis, the study investigated the outer loading of each item. It is investigated to determine if the items of this research have appropriate reliability to measure the variable. According to previous studies, the probability of item should be more than 95% which indicate the items are considered as significant to measure the variable. The study found that all items in this research to measure different variable were significantly accepted on the loadings. The findings of loadings are presented in Table 2.

Table 2: Loadings

						95% Confidence Interval	
Factor	**Indicator**	**Estimate**	**Std. Error**	**z-value**	**p**	**Lower**	**Upper**
SSCP	SSCP1	1	0			1	1
	SSCP2	0.977	0.069	14.225	< .001	0.842	1.112
	SSCP3	1.049	0.071	14.765	< .001	0.91	1.188
	SSCP4	1.056	0.071	14.967	< .001	0.918	1.194
	SSCP5	1.016	0.071	14.372	< .001	0.878	1.155
CSR	CSR1	1	0			1	1
	CSR2	0.975	0.07	13.857	< .001	0.837	1.113
	CSR3	1.055	0.072	14.614	< .001	0.913	1.196
	CSR4	1.012	0.07	14.365	< .001	0.874	1.15
	CSR5	1.064	0.074	14.362	< .001	0.919	1.209
AIC	AIC1	1	0			1	1
	AIC2	1.033	0.072	14.338	< .001	0.892	1.174
	AIC3	1.11	0.076	14.548	< .001	0.961	1.26
	AIC4	1.122	0.075	15.014	< .001	0.976	1.269
OSC	OSC1	1	0			1	1
	OSC2	1.756	0.294	5.979	< .001	1.18	2.331
	OSC3	2.174	0.416	5.232	< .001	1.36	2.989
GCA	GCA1	1	0			1	1
	GCA2	1.006	0.08	12.642	< .001	0.85	1.162
	GCA3	0.962	0.077	12.564	< .001	0.812	1.112
TMS	TMS1	1	0			1	1
	TMS2	0.957	0.062	15.342	< .001	0.835	1.08
	TMS3	0.941	0.063	14.948	< .001	0.818	1.064
	TMS4	0.931	0.061	15.207	< .001	0.811	1.051
	TMS5	0.958	0.063	15.098	< .001	0.834	1.083
DTR	DTR1	1	0			1	1
	DTR2	0.959	0.061	15.672	< .001	0.839	1.079
	DTR3	0.953	0.061	15.616	< .001	0.833	1.073
	DTR4	1	0.061	16.43	< .001	0.881	1.119
	DTR5	0.952	0.061	15.588	< .001	0.832	1.072

In this study, Table 3 presents the residual variances for all measurement indicators, reflecting the extent of unexplained variance after accounting for the latent constructs. The results indicate that most indicators exhibit moderate residual values, generally ranging between approximately 0.40 and 0.60, which suggests an acceptable level of measurement error. Indicators associated with sustainable supply chain practices, corporate social responsibility, and artificial intelligence capability demonstrate relatively consistent residual patterns, indicating reliable measurement. However, certain items within organizational sustainability culture show comparatively higher residual values, implying weaker

explanatory power. The findings confirm that the measurement model maintains adequate reliability, with acceptable levels of unexplained variance across constructs.

Table 3: Residual Variances

					95% Confidence Interval	
Indicator	**Estimate**	**Std. Error**	**z-value**	**p**	**Lower**	**Upper**
SSCP1	0.49	0.048	10.154	< .001	0.395	0.585
SSCP2	0.547	0.052	10.562	< .001	0.446	0.649
SSCP3	0.536	0.053	10.141	< .001	0.433	0.640
SSCP4	0.51	0.051	9.954	< .001	0.410	0.610
SSCP5	0.567	0.054	10.457	< .001	0.461	0.673
CSR1	0.545	0.052	10.442	< .001	0.443	0.648
CSR2	0.55	0.052	10.583	< .001	0.448	0.651
CSR3	0.502	0.051	9.914	< .001	0.402	0.601
CSR4	0.502	0.049	10.163	< .001	0.406	0.599
CSR5	0.556	0.055	10.165	< .001	0.449	0.664
AIC1	0.56	0.054	10.382	< .001	0.455	0.666
AIC2	0.474	0.049	9.691	< .001	0.378	0.570
AIC3	0.505	0.054	9.407	< .001	0.400	0.610
AIC4	0.417	0.049	8.580	< .001	0.322	0.513
OSC1	1.206	0.099	12.189	< .001	1.012	1.400
OSC2	0.619	0.111	5.573	< .001	0.401	0.836
OSC3	0.367	0.156	2.350	0.019	0.061	0.673
GCA1	0.508	0.065	7.796	< .001	0.380	0.635
GCA2	0.546	0.067	8.099	< .001	0.414	0.678
GCA3	0.55	0.064	8.566	< .001	0.424	0.676
TMS1	0.584	0.058	10.145	< .001	0.471	0.697
TMS2	0.532	0.053	10.129	< .001	0.429	0.635
TMS3	0.576	0.055	10.434	< .001	0.468	0.684
TMS4	0.523	0.051	10.239	< .001	0.423	0.624
TMS5	0.573	0.055	10.324	< .001	0.464	0.681
DTR1	0.531	0.052	10.165	< .001	0.429	0.633
DTR2	0.535	0.051	10.405	< .001	0.434	0.636
DTR3	0.536	0.051	10.443	< .001	0.435	0.636
DTR4	0.468	0.048	9.791	< .001	0.374	0.562
DTR5	0.538	0.051	10.462	< .001	0.437	0.639

The reliability of instrument used in this research framework. For measurement of reliability, this study focused on coefficient Omega which value should be above 0.70. The findings reported in Table 4 highlighted that the reliability was achieved as all the value of coefficient Omega were above 0.70 (Hair et al., 2021). Furthermore the study investigated the findings of coefficient alpha to determine the reliability as well. The findings of this study reported in Table 4 highlighted that all variables achieve coefficient alpha above 0.70 which is a significant threshold. Therefore, the reliability of all instruments with coefficient alpha was accepted.

Table 4: Reliability

	Coefficient ω	**Coefficient α**
SSCP	0.885	0.884
CSR	0.884	0.884
AIC	0.877	0.876
OSC	0.697	0.667
GCA	0.824	0.824

TMS	0.891	0.891
DTR	0.898	0.898
total	0.844	0.942

In statistics, average variance extracted (AVE) is a measure of the amount of variance that is captured by a construct in relation to the amount of variance due to measurement error. This study investigated the findings of AVE that should be above 0.50 to confirm the reliability of the variance (Hair et al., 2021). The findings of AVE reported in Table 5 highlighted that all variables achieved significant AVE. Hence, the study confirmed the reliability of the instruments was achieved.

Table 5: Average Variance Extracted

Factor	AVE
SSCP	0.606
CSR	0.605
AIC	0.641
OSC	0.455
GCA	0.610
TMS	0.621
DTR	0.639

The purpose of the discriminant validity assessment is to verify that a reflective construct exhibits stronger relationships with its own indicators than with those of any other construct. This study used Heterotrait-Monotrait (HTMT) method for the assessment of discriminant validity. HTMT is a new method suggested and used my modern researchers where the value of HTMT matrix should be less than 0.85 (Henseler et al., 2015). The findings of this study reported in Table 6 confirmed that HTMT was significantly achieved for all variables.

Table 6: t Heterotrait-Monotrait Ratio

SSCP	CSR	AIC	OSC	GCA	TMS	DTR
1						
0.479	1					
0.406	0.460	1				
0.525	0.616	0.772	1			
0.399	0.496	0.497	0.981	1		
0.535	0.485	0.536	0.635	0.556	1	
0.500	0.547	0.469	0.643	0.471	0.552	1

In this study, Table 7 presents the direct path relationships among the constructs, revealing statistically significant effects across most hypothesized relationships. The results indicate that sustainable supply chain practices have a strong positive impact on organizational sustainability culture ($\beta = 0.394$, $p < .001$), suggesting that effective implementation of sustainable practices enhances internal sustainability values within organizations. Additionally, sustainable supply chain practices demonstrate a significant positive effect on green competitive advantage ($\beta = 0.18$, $p < .001$), although the magnitude is comparatively moderate. Corporate social responsibility also exerts significant positive influences on both organizational sustainability culture ($\beta = 0.223$, $p < .001$) and green competitive advantage ($\beta = 0.34$, $p < .001$), indicating its critical role in strengthening both internal culture and external competitiveness. Similarly, artificial intelligence capability significantly affects organizational sustainability culture ($\beta = 0.183$, $p < .001$), reflecting its contribution to improved organizational processes. However, the direct effect of artificial intelligence capability on green competitive advantage (H6) is not supported despite statistical significance, likely due to its

comparatively weaker coefficient (β = 0.134). Finally, organizational sustainability culture significantly enhances green competitive advantage (β = 0.216, p < .001), confirming its mediating importance in the proposed framework.

Table 7: Direct Paths

								95% Confidence Interval	
Paths				**Estimate**	**Std. error**	**z-value**	**p**	**Lower**	**Upper**
H1	SSCP	→	OSC	0.394	0.047	8.315	< .001	0.301	0.487
H2	SSCP	→	GCA	0.18	0.053	3.38	< .001	0.076	0.285
H3	CSR	→	OSC	0.223	0.051	4.376	< .001	0.123	0.323
H4	CSR	→	GCA	0.34	0.054	6.322	< .001	0.235	0.446
H5	AIC	→	OSC	0.183	0.052	3.51	< .001	0.081	0.285
H6	AIC	→	GCA	0.134	0.054	2.474	0.013	0.028	0.241
H7	OSC	→	GCA	0.216	0.056	3.851	< .001	0.106	0.326

In study presents the mediating effects of organizational sustainability culture in the relationships between key antecedents and green competitive advantage, with all hypothesized paths supported. The results indicate that organizational sustainability culture significantly mediates the relationship between sustainable supply chain practices and green competitive advantage (β = 0.085, p < .001), demonstrating that sustainability practices enhance competitive outcomes through cultural alignment. Similarly, the mediating effect between corporate social responsibility and green competitive advantage is positive and significant (β = 0.048, p = 0.004), suggesting that socially responsible initiatives strengthen internal sustainability values, which in turn drive competitive advantage. Furthermore, the indirect effect of artificial intelligence capability on green competitive advantage through organizational sustainability culture is also significant (β = 0.04, p = 0.009), highlighting the role of technological capability in reinforcing sustainability oriented culture. The confidence intervals for all paths exclude zero, confirming the robustness of the mediation effects. The results are reported in Table 8.

Table 8: Mediating Paths

										95% Confidence Interval	
Path						**Estimate**	**Std. error**	**z-value**	**p**	**Lower**	**Upper**
H8	SSCP	→	OSC	→	GCA	0.085	0.024	3.494	< .001	0.037	0.133
H9	CSR	→	OSC	→	GCA	0.048	0.017	2.891	0.004	0.016	0.081
H10	AIC	→	OSC	→	GCA	0.04	0.015	2.594	0.009	0.01	0.069

This study presents the moderating effects of top management support, corporate social responsibility interaction, artificial intelligence capability, and digital transformation readiness on key relationships within the model. The findings indicate that top management support significantly moderates the relationship between sustainable supply chain practices and organizational sustainability culture (β = 0.179, p = 0.013), suggesting that strong managerial commitment enhances the effectiveness of sustainability practices in shaping organizational culture. Similarly, the interaction between artificial intelligence capability and sustainable supply chain practices is statistically significant (β = 0.16, p = 0.021), indicating that technological capability strengthens the impact of supply chain practices on sustainability outcomes. In contrast, the moderating effect of corporate social responsibility on sustainable supply chain practices is not supported (β = 0.138, p = 0.057), as the relationship does not reach the required level of statistical significance. Furthermore, digital transformation readiness exhibits a strong and highly significant moderating effect on the relationship between organizational sustainability culture and green competitive advantage (β = 0.368, p < .001), highlighting its critical role in enabling organizations to translate cultural sustainability into competitive gains. The findings are reported in Table 9.

Table 9: Moderating Paths

Paths	**Unstandardized**	**Standard Error**	**Standardized**	**t**	**p**

H11	TMS*SSCP	0.172	0.069	0.179	2.484	0.013
H12	CSR*SSCP	0.135	0.071	0.138	1.907	0.057
H13	AIC*SSCP	0.158	0.068	0.16	2.311	0.021
H14	DTR*OSC	0.374	0.052	0.368	7.205	< .001

DISCUSSION

The findings of H1 reported that sustainable supply chain practices have a significant impact on organizational sustainability culture. Furthermore, the findings of H2 reported that sustainable supply chain practices have a significant impact on green competitive advantage. The findings of previous studies also highlighted that sustainable supply chain is a driving force for development of sustainability in the organizational culture. The studies report that and the supply chain is working on sustainable way, the integration of artificial intelligence improves it impact for Green's competitive advantage. The industries integrating sustainability in supply chain mechanism are leading in the world in the development of business process where the environmental impact of these businesses is in positive way (Saha et al., 2025). The modern businesses are required to focus on sustainability management in supply chain where the organizational culture and competitive advantage can be focused by the top management. A significant level of supply chain for utilization of resources fairly can improve the supply chain mechanism which advance the organizational culture (Guo et al., 2023). The organizational sustainability culture can be improved with the advancement and integration of partners in business management where they can focus on integration of common supply chain that can be helpful to utilize the resources in fairway (Rajput, 2024). It is necessary for advancement of supply chain practices where the strategic goal of organization can be achieved with sustainability culture development in the business environment.

The results of H3 reported that corporate social responsibility have a significant impact on organizational sustainability culture. The findings of H4 confirmed that corporate social responsibility have a significant impact on green competitive advantage. The findings of western studies also support this research by highlighting that corporate social responsibility is a key strategic factor for business development (Chowdhury et al., 2026). In the modern business environment, corporate social responsibility play a significant role that helps to the management in leading the organization in sustainable way. The organization mainly focusing on corporate social responsibility can achieve their maximum potential of business development and advancement of necessary factors can contribute in development of business (Tseng et al., 2022). It is corporate social responsibility which leads the businesses to focus on sustainable development where the advancement of business is aligned with the United Nations sustainability goals (Negri et al., 2024). Therefore, the organizations focusing on sustainability and sustainable development must have the environment of corporate social responsibility in the organization that can help to develop a significant mechanism of business development in the organizational environment (Moktadir et al., 2021). The previous studies also highlighted that corporate social responsibility must be part of manufacturing and service sector where the socially responsible organizations should function and preferred by the customers.

The results of H5 highlighted that artificial intelligence capability have a significant impact on organizational sustainability culture. However, the findings of H6 reported that artificial intelligence capability does not have a significant impact on green competitive advantage. In the changing environment of artificial intelligence in the business environment, the role of artificial intelligence is increased in the context of organizational working (Li et al., 2026). Majority of the organization in the modern time are focusing on sustainable development and advancement of mechanism for integration of artificial intelligence. This integration of artificial intelligence helps the companies to utilize the resources in fair way with decision making with maximum data. It is a necessary factor that helps the organizations to develop intelligence and context of business environment with the help of sustainability culture that is necessary for sustainable business development. In accordance, the

sustainability of business environment is important factor which reduces the function of business development that can be helpful in advancement of strategic goals of the business (Paksaz et al., 2024). Meanwhile, the integration of artificial intelligence in business practices can improve the efficiency the maximum potential of the business can be developed and focus on corporate social responsibility can be increased (Khokhar et al., 2025). Therefore, the modern organizations are recommended to focus on artificial intelligence integration in the business for maximum potential of the business and gain competitive advantage in the market. It is necessary factor that can lead the business to better positioning among the competitors.

The findings of H7 reported that organizational sustainability culture have a significant impact on green competitive advantage. The previous studies also highlighted that sustainability culture development in the organization by management can lead to improved business practices in the modern working environment (Bai et al., 2022). It is recommended for the organizations to focus on sustainable development which can help the management of culture and environment in green competitive advantage. The business practices of the modern time are necessary to develop business environment that can be supportive for business networking (Cui et al., 2026). It is highly recommended for business environment to focus on management of practices that can be supportive with the help of corporate social responsibility and management practices (Holgado et al., 2024). The necessary factor for business development is to develop building competitive advantage in the market which can help organizations to focus on the business environment to achieve the green sustainability. It is highly recommended to modern businesses to focus on integration of business networking which can advance the supporting environment and develop the green sustainable competitive advantage (Rehman et al., 2024). The socially responsible businesses are widely accepted by the customers where the focus is mainly on business development and the integration of different practices with the help of networking and partners.

The results of H8 reported that organizational sustainability culture mediates between sustainable supply chain practices and green competitive advantage. Furthermore, the findings of H9 pointed out that organizational sustainability culture mediates between corporate social responsibility and green competitive advantage. Finally, the results of H10 stated that organizational sustainability culture mediates between artificial intelligence capability and green competitive advantage. The existing studies in the body of knowledge also reported that organizational sustainability is necessary factor in the development of supply chain with the help of partners (Behl et al., 2024). It is important to utilize the resources fairly by advancing the competitive advantage in the market over the competitors. This factor helps though improve the culturally integrated social sustainability environment which focus on business networking and advancement of sustainability in the market (Singh, 2024). The modern businesses are recommended to highly focus on sustainable development which advance the competition advantage by integrating the improved network of supply chain. Supply chain is the integrating part of business among the networking and partners, and more sustainability in the supply chain can leads to development of successful business environment that can enrich the business among the competitors (Jena & Meena, 2022). The necessary factor to improve the supply chain is with the help of advancement in business development where the fair use of supply chain and its related practices can be improved (Yadav et al., 2024). The focus of supply chain on business development is necessary but corporate social responsibility should be integrated as the process of supply chain that can support the business environment and the development of modern business.

The results of H11 stated that top management support moderates between sustainable supply chain practices and organizational sustainability culture. Meanwhile, H12 findings reported that top management support does not moderate between corporate social responsibility and organizational sustainability culture. Nevertheless, H13 findings asserted that top management support moderates between artificial intelligence capability and organizational sustainability culture. The role of top management is important in advancement of sustainability in supply chain practices where the

organizational sustainable culture can be developed (Heriyati et al., 2024). The top management have leading role in development of culture of sustainable supply chain among the partners that can be implemented in the form of comprehensive framework of the business (Jin et al., 2025). It has become the requirement of modern businesses to integrate supply chain mechanism in business environment that can be helpful for integration of business in the modern time. The requirement of business in the modern time leads to sustainable competitive advantage where the businesses are recommended to highly focus on sustainable environment that can enrich the networking among the partners and development of supply chain (Alma'abreh et al., 2026). It is an important factor for business development that leads to sustainable business practices and integrating the modern business facilities in the modern environment (Ghouri et al., 2023). Therefore, the top leadership should be considered as a key success factor for implementing the policies of sustainable supply chain and artificial intelligence to improve organizational sustainability culture.

Finally, the findings of H14 stated that digital transformation readiness moderates between organizational sustainability and green competitive advantage. The previous studies also highlighted that digital transformation readiness is a significant factor that can contribute to grain competitive advantage (Rashid et al., 2025). The businesses already ready to compete in the market and integrate the modern technology can be working properly as compared to the competitors to integrate the artificial intelligence. The modern tools of business networking and business design are necessary and modern technologies should be integrated part of it (Kshetri, 2021). The focus on multimedia and digital dashboards of business environment can increase the growth of business in modern time that is the leading factor to develop the competitive advantage over the other partners in the same industry. It is necessary for the businesses to focus on digital transformation with the changing environment and rapidly growth of artificial intelligence (Basu et al., 2024). It is necessary factor that can contribute to business development which helps the advancement of modern goals of technology embedded in the business environment. Without the integration of appropriate technology according to the requirement, it would be difficult for businesses to grow in the market that can lead to less focus on artificial intelligence (Kleinknecht, 2021). Therefore, the modern businesses are focusing on integration of artificial intelligence into the business environment and they are getting ready for the changing digital dynamics of business competition (Lv, 2025). It is the way that would be helpful for these businesses to develop a leading competitive advantage on the competitors.

THEORETICAL IMPLICATIONS

The study adds to existing knowledge by creating an integrated framework of sustainable supply chains, artificial intelligence capability, and corporate social responsibility as three important drivers of green competitive advantage. More than previous studies, which often look only at individual relationships, this study develops theoretical insights that help to explain how these drivers relate to competitive outcomes, by including a construct of organisational sustainability culture as a central mediator. In addition, the study enriches the conceptual model by including top management support and digital transformation readiness as moderating factors that capture important contextual influences that were previously ignored in the literature. Furthermore, the study extends the development of resource-based and capability-based perspectives by demonstrating how technological and sustainability-oriented resources interact within the organisational context. The successful empirical testing of these relationships in the United Kingdom provides valuable, and contextually specific, insights that support the generality and applicability of sustainability theories. The creation of a multidimensional and empirically tested atmosphere through this study addresses gaps in the literature and will assist future research on integrated sustainability strategies and competitive advantage mechanisms.

PRACTICAL IMPLICATIONS

The implications of the results of the study are very useful to business managers, policy makers and executives in improving their business's green competitive advantage in the UK. In this regard, implementation of sustainable supply chain practices as a strategic priority was found to be important to meet environmental regulations and increase competitive advantage. To improve operational efficiency, utilize resources more effectively, and make better use of data in the decision-making process, firms should invest in developing artificial intelligence capabilities. In addition, corporate social responsibility initiatives need to be integrated into the core business strategy so that they enhance stakeholder trust and legitimacy for the organization. In addition, the strong mediating role of the organizational sustainability culture suggests that organizations need to develop an internal organizational culture that supports sustainability values through employee training, commitment from executive leadership, and the integration of sustainable practices into policy development. Additionally, organizations need to realize that top management support is critical to successful implementation of sustainable business practices and that being ready for digital transformation will enable organizations to connect cultural orientation to competitive advantage. In order to fully realize the value of sustainability initiatives for long-term performance, businesses should seek to enhance executive engagement and build e-business infrastructure.

FUTURE DIRECTIONS

The research in the future can work on this research done here by performing research studies in a longitudinal design to investigate the dynamic nature of sustainable supply chain practices, artificial intelligence capabilities and corporate social responsibility over time. Having a longitudinal research design will provide researchers the opportunity to better identify causal relationships as well as how the sustainability culture within organisations develops and impacts their green competitive advantage through the varying levels of maturity within the organisation. Future research could also study additional mediating mechanisms such as innovation capabilities or knowledge management practices, to further enhance the internal processes that connect the strategic drivers to competitive outcomes. Furthermore, research conducted in countries outside of the United Kingdom would provide a comparative analysis of sustainability frameworks in various institutional environments across the world. Accordingly, future research could also conduct analyses of sustainability practices and technological adoption by sector, which would provide further insights into this field. Likewise, researchers could enrich their understanding of this field by including qualitative research, such as using a case study or conducting interviews to provide a true representation of the contextual or experiential aspects often excluded from quantitative studies. Finally, researchers could further investigate the use of new technologies such as machine learning applications and blockchain technology, as they relate to sustainability frameworks, as they will improve supply chain operations by increasing transparency, traceability and efficiency.

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SUSTAINABLE SUPPLY CHAIN PRACTICES

- The organization integrates environmental considerations into supply chain operations.
- The organization emphasizes efficient use of resources across supply chain activities.
- The organization collaborates with suppliers to ensure sustainability standards.
- The organization adopts environmentally friendly logistics and transportation methods.
- The organization monitors and evaluates sustainability performance within the supply chain.

CORPORATE SOCIAL RESPONSIBILITY

- The organization actively engages in socially responsible activities.
- The organization considers stakeholder interests in decision making.
- The organization contributes to environmental protection initiatives.
- The organization ensures ethical practices in its operations.
- The organization promotes community development and social well-being.

ARTIFICIAL INTELLIGENCE CAPABILITY

- The organization uses artificial intelligence in decision making processes.
- Artificial intelligence improves the efficiency of organizational operations.
- The organization has the necessary infrastructure to implement artificial intelligence solutions.
- Artificial intelligence supports innovation and sustainability initiatives.

ORGANIZATIONAL SUSTAINABILITY CULTURE

- Sustainability values are embedded in the organizational culture.
- Employees are encouraged to engage in sustainable practices.
- The organization promotes awareness of environmental responsibility.

GREEN COMPETITIVE ADVANTAGE

- The organization achieves competitive advantage through environmentally responsible practices.
- Sustainability initiatives improve the organization's market position.
- The organization differentiates itself through green innovation and performance.

TOP MANAGEMENT SUPPORT

- Top management actively supports sustainability initiatives.
- Leadership provides sufficient resources for sustainable practices.
- Top management encourages innovation related to sustainability.
- Leadership commitment drives sustainability efforts.
- Sustainability is integrated into strategic planning by management.

DIGITAL TRANSFORMATION READINESS

- The organization is prepared to adopt digital technologies.
- Digital infrastructure effectively supports organizational innovation.
- Employees possess adequate digital skills.
- The organization invests strategically in digital transformation.
- Digital readiness enhances organizational adaptability and performance.