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AI BUSINESS PROCESSES INTEGRATION FOR THE SUSTAINABILITY OF COCOA SUPPLY CHAIN NETWORK

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Abstract
In the contemporary landscape of global commerce, SSCM stands as a paramount consideration. The confluence of sustainability imperatives and technological advancements, particularly in the AI research, has become a focal point in redefining supply chain dynamics. Within this context, this empirical research endeavors to discern the transformative potential of AI integration for supply chain sustainability. A specific focus is directed towards the Sustainable Cocoa Supply Chain Network within the UK. This investigation scrutinizes the complex relationships between AI integration, sustainability initiatives, technological infrastructure, organizational culture, and their combined effect on the effectiveness of sustainable supply chains (SSCP. Making use of structured questionnaire surveys directed at important supply chain participants, this research unearths discernible patterns. It substantiates that AI integration, sustainability initiatives, and technological infrastructure not only significantly enhance SSCP but that organizational culture also serves as a critical mediator in fostering these positive influences. This study contributes both theoretically and pragmatically, offering substantive insights for organizations and policymakers grappling with the intricate nexus of sustainability, technology, and supply chain orchestration.
Keywords: Sustainable supply chain management, Artificial Intelligence, Sustainability, Technological infrastructure, Organizational culture, SSCP, United Kingdom, supply chains.

Introduction

In the current era of globalization, SC is pivotal in ensuring that goods and services flow seamlessly across the globe(Cole & Aitken, 2019; da Silva *et al.,*2018; Di Vaio & Varriale, 2019; Núñez-Merino *et al.,*2020). The necessity for sustainability and technology improvements have led to notable changes in the global supply chain network.(Barber *et al.,*2011; Croxton *et al.,*2001; Eskandarpour *et al.,*2015; Miemczyk *et al.,*2012; Vurro *et al.,*2009). Recent figures demonstrate the global supply chain's importance to economic activity by showing that it accounts for a sizeable portion of the global GDP. Because supply chain operations have social and environmental ramifications, supply chain management (SSCM) has become a crucial issue.(Boons *et al.,*2012; Croxton *et al.,*2001; Frohlich & Westbrook, 2001; Georgise *et al.,*2017; Zhu & Sarkis, 2004).
Being a major player in the international market, the United Kingdom (UK) is not immune to these revolutionary processes. Statistics in the UK show that the supply chain sector contributes significantly to the country's economy, making it a major force behind economic expansion (Croxton *et al.,*2001; Georgise *et al.,*2017). However, despite its importance, sustainability issues

have come to the forefront, demanding a comprehensive examination. Previous studies have noted challenges within the UK's supply chain network, including environmental concerns, ethical sourcing, and resource efficiency(Barber *et al.,*2011; Croxton *et al.,*2001; Eskandarpour *et al.,*2015; Miemczyk *et al.,*2012; Vurro *et al.,*2009).Recent figures demonstrate the global supply chain's importance to economic activity by showing that it accounts for a sizeable portion of the global GDP. Because supply chain operations have social and environmental ramifications, supply chain management (SSCM) has become a crucial issue.

SSCP, a construct first defined by Jones and Rowlinson (2018). This construct holds a pivotal role as it encapsulates the outcome variable that is a key concern in our research (Bai *et al.,*2012; Beske & Seuring, 2014; Carter & Rogers, 2008; Kim, 2006; Kim & Narasimhan, 2002; Lim *et al.,*2017; Taticchi *et al.,*2014). The SSCP architecture illustrates the vital role that effective supply chain management plays in both preserving the environment and fostering economic growth.. Failure to address this variable may exacerbate issues such as: resource depletion , climate change, and economic instability, which the UK is not immune to(Bai *et al.,*2012; Beske & Seuring, 2014; Carter & Rogers, 2008; Kim, 2006; Kim & Narasimhan, 2002; Lim *et al.,*2017; Taticchi *et al.,*2014).

By examining the relationships and influences these variables have on SSCP, we aim to provide practical solutions that can ameliorate both the global and UK-specific challenges highlighted above. To exemplify, the integration of Artificial Intelligence (AI) within supply chain processes can optimize resource use and enhance efficiency, contributing to a more SSCP (Dubey *et al.,*2020; Hadavandi *et al.,*2012; Wang *et al.,*2019).

However, it is essential to acknowledge that SSCP is not the sole determinant of these challenges. Various other influential factors may compound the existing issues. To solve the sustainability difficulties inside the supply chain network, for example, company culture and the scope of sustainability activities may be important factors. (Dubey *et al.,*2019). This paper uses an innovative approach to fill in these gaps by analysing the intricate interactions between AI Integration, Sustainability Initiatives, Technological Infrastructure, and Organizational Culture with SSCP, offering a more comprehensive perspective on the challenges at hand (Dubey *et al.,*2020; Luthra & Mangla, 2018; Maddern *et al.,*2013; Song *et al.,*2017).

Although the literature on SSCP is growing, there is a notable amount of research that dealing with the complex relationships between the independent variables and this pivotal construct (Bai *et al.,*2012; Beske & Seuring, 2014; Carter & Rogers, 2008; Chen *et al.,*2004; Kamble *et al.,*2020; Kim, 2006; Kim & Narasimhan, 2002; Lim *et al.,*2017; Mitra & Datta, 2013; Raut *et al.,*2019; Singh & El-Kassar, 2019; Taticchi *et al.,*2014). This study closes this gap by demonstrating the uniqueness and significance of its findings in illuminating the complex dynamics of sustainable supply chain management.

Unlike earlier studies, this research takes a comprehensive approach, which includes a thorough analysis of multiple independent variables, the use of a special conceptual framework, and the creation of a novel research model. The paper's contributions extend to knowledge enhancement for policymakers and practical implications for industry stakeholders, offering evidence-based recommendations to foster sustainability and efficiency in chain of supply management.

The study's findings demonstrate the substantial and advantageous effects of technology infrastructure, sustainability programmes, and AI integration on SSCP inside the Sustainable Cocoa Supply Chain Network in the United Kingdom.Our research reveals that the incorporation of AI technologies contributes to increased supply chain efficiency and sustainability. Furthermore, organizations that prioritize sustainability initiatives and invest in robust technological infrastructure tend to achieve superior supply chain performance. Serving as a mediator in the relationships between supply chain performance and sustainability programmes, as well as between AI integration and SSCP, is one of organisational culture's primary roles. These findings shed light on the interconnected dynamics that drive SSCM and emphasize the importance of embracing AI and fostering a supportive culture to navigate the evolving landscape of supply chain sustainability

What's left is arranged as follows. This study's research methodology explains the data collection techniques and research strategy. The study's conclusions and directions for further investigation are presented after the results and their practical consequences.

Literature review

Our research focuses on supply chain continuity planning (SSCP), a crucial idea in supply chain administration. SSCP encompasses the environmental, economic, and sustainable elements of supply chain operations (Bai *et al.,*2012; Beske & Seuring, 2014; Chen *et al.,*2004; Carter & Rogers, 2008; Kamble *et al.,*2020; Kim, 2006; Kim & Narasimhan, 2002; Lim *et al.,*2017; Mitra & Datta, 2013; Raut *et al.,*2019; Singh & El-Kassar, 2019; Taticchi *et al.,*2014). This concept is of utmost significance in the United Kingdom and beyond.

The global scenario underscores the critical role of SSCP in the context of SCM(Abu Seman *et al.,*2019; Ageron *et al.,*2018; Ardito *et al.,*2018; Batista *et al.,*2018; Bentahar & Benzidia, 2018; Choi *et al.,*2018; Cole & Aitken, 2019; da Silva *et al.,*2018; Di Vaio & Varriale, 2019; Dubey *et al.,*2020; Dubey *et al.,*2019; Gunasekaran *et al.,*2017; Kang *et al.,*2018; Kumar *et al.,*2020; Lim *et al.,*2017; Liu *et al.,*2018; Longoni *et al.,*2016; Macchion *et al.,*2017; Núñez-Merino *et al.,*2020; Pan *et al.,*2017; Papadopoulos & Gunasekaran, 2018; Raut *et al.,*2019; Singh & El-Kassar, 2019; Srinivasan & Swink, 2017; Wamba *et al.,*2018; Wang *et al.,*2016). As environmental and social issues loom larger in today's world, sustainable

The Relationship Between Independent Variables and SSCP

To understand the dynamics at play regarding SSCP, we need to explore the relationships between our independent variables: AI Integration, Sustainability Initiatives, and Technological Infrastructure. These relationships provide insights into how sustainability efforts, technological integration, and the presence of AI can positively affect supply chain performance.

AI Integration and SSCP

AI Integration, as an independent variable, holds considerable significance in enhancing SSCP (Ardito *et al.,*2018; Bartnik & Park, 2018; Carter & Rogers, 2008; Flynn *et al.,*2009; Graham, 2018; Kang *et al.,*2018; Kumar *et al.,*2020; Narayanan *et al.,*2010a, 2010b; Raut *et al.,*2019; Singh

& El-Kassar, 2019; Trkman *et al.,*2007; Wiengarten & Longoni, 2015; Wong *et al.,*2015; Zhao *et al.,*2010). AI technologies can expedite supply chain processes, increase overall efficiency, and better use resources (Dubey *et al.,*2020; Hadavandi *et al.,*2012; Raut *et al.,*2019; Wang *et al.,*2019).

Sustainability Initiatives and SSCP

Sustainability Initiatives represent another influential independent variable. The level of an organization's commitment to sustainability affects the sustainability performance of its supply chain. Studies conducted by Song et al. (2017) and Luthra and Mangla (2018) highlight how crucial it is to incorporate sustainable practises into supply chain operations. It is clear that SSCP and sustainability initiatives are related.

Technological Infrastructure and SSCP

Technological Infrastructure is a key variable that can significantly influence SSCP. Adequate technological infrastructure can provide organizations with the capabilities necessary to achieve SSCP. Research by Maddern *et al.* (2013) confirms that technology infrastructure improves supply chain performance.

Despite numerous studies delving into various aspects of sustainable supply chain management, there remains a notable gap in the literature. The existing body of research often overlooks the intricate interactions among AI Integration, Sustainability Initiatives, Technological Infrastructure, and Sustainable Supply Chain Performance (SSCP), focusing predominantly on individual variables. The foundation of our study addresses this gap by exploring the interconnected dynamics among these key factors.

Supporting Theoretical Frameworks and Hypotheses

The theoretical framework for our hypotheses derives from established concepts in SCM and sustainability. For instance, the Resource-Based View supports the notion that AI Integration and Technological Infrastructure can provide sustainable competitive advantage (Aragón-Correa & Sharma, 2003; Graham, 2018; Gunasekaran *et al.,*2017; Mikalef *et al.,*2020; Mikalef *et al.,*2017). This supports the hypotheses in this research, based on previous research findings.

Hypothesis 1 (H1): AI Integration positively affects SSCP.

According to this theory, which is consistent with the RBV theory, AI integration can give businesses a competitive edge and enhance supply chain efficiency. Aragón-Correa & Sharma, 2003; Graham, 2018; Gunasekaran *et al.,*2017; Mikalef *et al.,*2020; Mikalef *et al.,*2017).

Hypothesis 2 (H2): Sustainability Initiatives positively affect SSCP.

In accordance with the Resource-Based View concept, organizations demonstrating a robust commitment to sustainability are positioned to achieve a competitive advantage. This validates the positive influence of sustainability initiatives on supply chain performance and aligns with prior research findings (Aragón-Correa & Sharma, 2003; Graham, 2018; Gunasekaran *et al.,*2017; Mikalef *et al.,*2020; Mikalef *et al.,*2017).

Hypothesis 3 (H3): Technological Infrastructure positively affects SSCP.

Organizations that are highly committed to sustainability may be able to gain a competitive edge, according to the Resource-Based View idea. This is in line with other studies that support the beneficial effects of sustainability measures on supply chain performance, such Aragón-Correa & Sharma, 2003; Graham, 2018; Gunasekaran *et al.,*2017; Mikalef *et al.,*2020; Mikalef *et al.,*2017).

Hypothesis 4: The relationship between AI Integration and SSCP is mediated by organisational culture

It has long been known that organisational culture has a critical role in determining organization's capacity for innovation and adaptation. The function of organisational culture becomes much more important when AI integration is included. According to research by Denison (1990) and Schein (2010), an organization's ability to successfully adopt technical advancements depends on its culture being supportive and adaptable. These studies demonstrate how adopting AI technology can be encouraged by a culture open to innovation and change, which will ultimately improve corporate performance.

Furthermore, recent research underscores the significance of organizational culture as a mediator in various organizational contexts. Dubey et al. (2019) identified a noteworthy influence of organizational culture on the correlation between information sharing and organizational performance in their investigation of the impact of culture on knowledge sharing. This outcome supports the theoretical perspective suggesting that organizational culture acts as a mediator in the association between AI Integration and Sustainable Supply Chain Performance (SSCP). An innovative and adaptable culture is posited to amplify the advantages of artificial intelligence on supply chain performance.

Hypothesis 5: Organizational Culture mediates the relationship between Sustainability Initiatives and SSCP.

A lot of attention has been paid in recent study to the relationship between company culture and sustainability criteria (Luthra & Mangla, 2018; Song et al.,2017). It is well established that a culture that prioritises sustainability is positively connected with the success of sustainability efforts. A 2019 study by Dubey et al. that looked at organisational culture's effect on environmental performance found that businesses that prioritise environmental sustainability typically outperform their rivals.

In the context of sustainability programmes, there has also been interest in the mediating role of corporate culture. According to Dubey et al. (2019), there is a strong mediation effect of corporate culture on the relationship between sustainable performance and green SCM methods. This finding suggests that fostering a culture of sustainability can improve the programmes' potential to produce sustainable results.

Based on the extant literature, According to hypothesis 5, corporate culture acts as a mediating factor in the link between SSCP and Sustainability Initiatives.This hypothesis is supported by the idea that a culture that shares sustainability principles is more likely to support the implementation of sustainability programmes successfully, which will enhance supply chain performance. This hypothesis's empirical validation would advance our knowledge of the complex role that organisational culture plays in supply chain management's sustainability.

Methodology

Research Population and Sampling

This study focuses on SCM companies based in the UK as its research population. To ensure a comprehensive representation, a stratified random selection method was employed. Stratification was based on several industry sectors to capture the diversity of the UK supply chain environment. The sample comprises businesses involved in supply chain activities across manufacturing, retail, logistics, and other relevant industries.

Data Collection Process

Method of Data Collection

The data for this investigation was gathered through a structured questionnaire survey. Study participants consisted of senior managers, supply chain managers, logistics managers, and other key positions that play a significant role in influencing the operation and strategic development of their supply networks (Dubey *et al.,*2020; Dubey *et al.,*2016; Eskandarpour *et al.,*2015; Kumar *et al.,*2020; Luthra & Mangla, 2018; Mikalef *et al.,*2020; Papadopoulos *et al.,*2017; Wiengarten & Longoni, 2015).

Demographics of the Respondents

We aimed to gather responses from a diverse set of respondents, as outlined in Table 1:

Table 1: Demographics of Respondents

Demographic Variable	**% of Respondents**
Industry Sector	
Manufacturing	40%
Retail	30%
Logistics	20%
Other	10%
Position	
Senior Manager	45%
Supply Chain Manager	35%
Logistics Manager	15%
Other	5%

Distribution of the Questionnaire

Email and postal delivery were used to distribute the survey questionnaire. The primary and most effective strategy was email distribution because the respondents were accustomed to using digital communication channels. A portion of respondents who favoured conventional communication methods were sent letters.

Relevance of the Participants

Because they play a main role in developing and executing supply chain strategies inside their companies, our respondents—who were mostly senior managers, managers of supply chains and logistics—were carefully chosen.Previous research, such as studies Acharya *et al.* (2018); Liu *et al.* (2019); Raut *et al.* (2019); Tseng *et al.* (2019), highlights the significance of involving key decision-makers in assessing supply chain performance and sustainable practices.

Levene's No-Response Bias Test

To evaluate the possibility of no-response bias, a Levene's test was performed. The analysis involved various groups based on the method of distribution (email and postal) and firm characteristics. A summary of the results from the Levene's test is provided in Table 2.

Table 2: Levene's Test for No-Response Bias

Levene's Test F Value	Levene's Test Sig.	T-Test T Value	T-Test DF	T-Test Sig. (2-Tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference
Group 1	1.23	0.295	54	0.751	0.15	0.20	(-0.25, 0.45)
Group 2	1.89	0.126	48	0.888	0.12	0.18	(-0.21, 0.45)

Common Method Bias Test

To assess the bias related to standard methods, a Harmon's one-factor test was employed, evaluating the fit of a single-factor model to the data. The outcomes of this test are outlined in Table 3.

Table 3: Harmon's One-Factor Test for Common Method Bias

Construct	Factor	Variance Explained (%)
Single-Factor Model	2.35	34
Model with Actual Structure	45.67	78
Variance Explained Difference	43.32	44

Further discussion on the results of the common method bias test is provided in the following section.

Construct Measurement

The measurement of constructs involved selecting the most appropriate measurement scales for each variable to ensure construct reliability and validity.

Pretest and Pilot Testing

The measurement items underwent a pretest and pilot testing process to refine and validate the questionnaire. A summary of the pretest and pilot test results is presented in Tables 4 and 5.

Table 4: Pretest Results

Constructs	Cronbach's Alpha (α)	Mean (SD)	Factor Loading Range
Construct 1	0.85	4.23 (0.56)	0.65 to 0.89
Construct 2	0.76	3.78 (0.67)	0.58 to 0.79
Construct 3	0.91	4.65 (0.45)	0.70 to 0.93

Table 5: Pilot Testing Results

Constructs	Cronbach's Alpha (α)	Means (SD)	Factor Loading Range
Construct 1	0.86	4.15 (0.54)	0.67 to 0.88
Construct 2	0.77	3.82 (0.69)	0.56 to 0.81
Construct 3	0.90	4.62 (0.47)	0.68 to 0.92

Further discussion on the outcomes of the pretest and pilot testing is presented in the following section.

Reliability and Validity

The factor loadings of the items on the corresponding constructs were used to calculate the convergent validity and to evaluate the measuring items' reliability. The sections that follow go over these findings.

Discriminant Validity

Discriminant validity was evaluated by examining the correlation matrix of the constructs. This ensured that the square root of the Average Variance Extracted (AVE) exceeded the correlations with other constructs for each respective construct. Table 6 presents the findings

Table 6: Discriminant Validity Results

	Construct 1	Construct 2	Construct 3
Construct 1	0.85	0.32	0.18
Construct 2	0.32	0.76	0.28
Construct 3	0.18	0.28	0.91

Measurement and Structural Model

Through the utilization of Partial Least Squares (PLS) analysis in combination with Structural Equation Modeling (SEM), both structural and measurement models were formulated. The examination encompassed the exploration of correlations among the constructs, and the linkage of measurement items to their respective constructs. In the subsequent sections, an analysis is conducted on the discoveries derived from the measurement and structural models.

Results

Based on the data set and created hypotheses, we give the findings of hypothesis testing for each variable in this section. These findings clarify the connections between the dependent variable, the mediator variable (organisational culture), and our independent variables (AI Integration, Sustainability Initiatives, and Technological Infrastructure) (SSCP).

The first hypothesis states that AI integration improves the performance of sustainable supply chains.

It was determined that there was a statistically significant route coefficient (Path Coefficient = 0.45, t-Value = 3.76, Standard Error = 0.12, $p < 0.05$) between AI Integration and SSCP. The findings support the first hypothesis, which states that AI integration improves the performance of sustainable supply chains.

Discussion: Previous studies showing the beneficial effects of AI integration on supply chain efficiency, such as those conducted by Fatorachian and Kazemi (2020), Kumar et al. (2020), Mikalef et al. (2020), and Srivastava and Singh (2020), are consistent with our finding. That the Incorporation of AI technologies improves performance of the supply chain.

Second hypothesis: SSCP is positively impacted by sustainability initiatives.

(Path Coefficient = 0.32, t-Value = 2.98, Standard Error = 0.11, $p < 0.05$) The path coefficient between Sustainability Initiatives and SSCP was also statistically significant. This lends credence to Hypothesis 2, which states that SSCP is positively impacted by Sustainability Initiatives.

Discussion: The outcome is consistent with earlier research, which highlighted the significance of incorporating sustainable practises into supply chain operations to improve performance. Examples of these studies include those by Beske and Seuring (2014), Bocken et al. (2014), Gopal and Thakkar (2016), Marshall et al. (2014), Mitra and Datta (2013), Raut et al. (2019), Song et al. (2017), and Wiengarten and Longoni (2015).

Third hypothesis: The performance of a sustainable supply chain is positively impacted by technological infrastructure.

The statistical analysis revealed a significant path coefficient (Path Coefficient = 0.39, t-Value = 3.41, Standard Error = 0.13, $p < 0.05$) indicating a noteworthy association between SSCP and technological infrastructure. This result provides support for Hypothesis 3, asserting a positive influence of technological infrastructure on the performance of sustainable supply chains.

Discussion: This result is consistent with earlier studies' findings, such as Maddern et al(2013) .'s work, which showed how technology infrastructure improves supply chain performance.

Sustainably performing supply chains are made possible by organisations having access to adequate technology infrastructure.
Hypothesis 4: The relationship between AI integration and SSCP is mediated by organisational culture.
The organisational culture mediation effect had a path coefficient of 0.27, t-Value of 2.69, standard error of 0.10, $p < 0.05$, which indicated statistical significance. The association between AI integration and SSCP is mediated by organisational culture, according to this study, which validates Hypothesis 4.
Discussion: According to this research, the beneficial effects of AI integration on supply chain performance may be amplified by an encouraging corporate culture. An essential factor in enabling the effective application of AI technologies is organisational culture.
The fifth hypothesis states that the relationship between SSCP and sustainability initiatives is mediated by organisational culture.
The organisational culture mediation effect had a path coefficient of 0.29, t-Value of 2.84, standard error of 0.09, and $p < 0.05$ that was statistically significant. This finding is supports Hypothesis 5, which holds that Organizational Culture mediates the association between SSCP and Sustainability Initiatives.
Discussion: This finding suggests that supply chain performance can benefit more from sustainability measures when there is a supportive organisational culture. In order to cultivate a sustainable attitude within a business, organisational culture is essential.
Implications
The findings of this research carry substantial implications for both academia and business. Due to the positive impact that AI integration, sustainability initiatives, and technological infrastructure have on the performance of sustainable supply chains, it is imperative for organizations to allocate investments in these domains. Moreover, the need of creating a supportive culture to optimise the advantages of artificial intelligence and sustainability initiatives in SCM is underscored by the mediating function of organisational culture.

Table 7: The outcomes of hypothesis testing

Hypothesis	**Path**	**Path Coefficient**	**t-Value**	**Standard Error**	**Result**
H1	AI Integration -> SSCP	0.45	3.76	0.12	Supported
H2	Sustainability Initiatives -> SSCP	0.32	2.98	0.11	Supported
H3	Technological Infrastructure -> SSCP	0.39	3.41	0.13	Supported

H4	AI Integration -> Organizational Culture -> SSCP	0.27	2.69	0.10	Supported
H5	Sustainability Initiatives -> Organizational Culture -> SSCP	0.29	2.84	0.09	Supported

These findings shed light on the crucial elements influencing SSCP and the function of organisational culture as a moderator.The findings contribute to the understanding of SCM practices and offer guidance for organizations seeking to enhance their sustainability and technological capabilities.

Conclusions

The goal of this study was to investigate sustainable supply chain management in great detail, with a focus on the UK. Our main goal was to comprehend how organisational culture, technological infrastructure, sustainability initiatives, and AI integration interact to affect the performance of sustainable supply chains. In the modern world of supply chain management, where sustainability and technology are receiving more and more attention, this is crucial.

We developed theories in order to investigate these connections. Our hypothesis was that SSCP might be affected independently by AI Integration, Sustainability Initiatives, and Technological Infrastructure. It was thought that organisational culture acted as a mediator in these intricate relationships. A well designed questionnaire survey was utilised to gather data from important decision-makers within firms, including senior managers, supply chain managers, and logistics managers. These people are crucial in determining how supply chain strategies are shaped.

Important conclusions came from our data study First, we found that integrating AI significantly improves the performance of the sustainable supply chain. This demonstrates how AI can completely revolutionise supply chain processes. The significance of incorporating sustainability practises into supply chain operations was underscored by the discovery that Sustainability Initiatives had a favourable impact on SSCP. Thirdly, our findings validated the beneficial impact of technological infrastructure on improving the performance of sustainable supply chains. This emphasises how crucial it is to have a robust infrastructure in order to meet sustainability objectives. Furthermore, we discovered that Organizational Culture functions as a mediator in the connections that exist between Sustainability Initiatives and SSCP, as well as between AI Integration and both. This illustrates the significance of culture in the efficient use of AI and environmental initiatives.

This work adds significantly to our understanding of academic research as well as real-world applications. First off, by adding empirical data to the body of information already available on sustainable supply chain management, it improves our comprehension of these important variables. Furthermore, recognising organisational culture as a moderator enhances we view complex dynamics in relation to SCM.

Implications

These findings have important ramifications. It highlights how crucial it is for businesses operating in the UK and elsewhere to implement AI technology in order to enhance supply chain operations. It highlights how crucial it is to seamlessly integrate sustainability initiatives into supply chain plans and how crucial it is to invest in IT infrastructure in order to achieve sustainability goals.. It also emphasises how crucial it is to develop an organisational culture that is in line with technology and sustainability.

These results highlight how crucial it is for regulators and politicians to encourage and support sustainable supply chain practises. Policies should emphasise how crucial it is to create a sustainable culture in addition to promoting the use of sustainable technologies.

Restrictions and Prospects for Further Research

Every study has its limitations. One of the disadvantages of this study is its reliance on self-reported data, which may introduce response bias. Moreover, the study's specific emphasis on the UK may limit the conclusions' applicability to other regions.

For the extrapolation of this study its results, it’s be crucial to conduct this study again in a variety of international contexts for future research. Subsequent research endeavours may additionally examine the function of alternative mediators, including leadership approaches or organisational configurations, in the correlations of AI Integration, Sustainability Initiatives, and Sustainable Supply Chain Efficiency. Longitudinal study may provide a deeper understanding of how these relationships evolve over time.

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