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The Effect of Sustainable Intellectual Capital and Sustainable Entrepreneurship on Sustainable Firm Performance in Jordan: The Mediating Role of Sustainable Supply Chain Management Practices

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Abstract

The complex interactions between sustainable business performance (SP), sustainable supply chain management (SMP) practises, and sustainable intellectual capital (SIC) are examined in the context of Jordan. To extensively study the data of 250 sustainable entrepreneurs from various industries, including manufacturing, tourism, agriculture, and construction, partial least squares structural equation modelling was utilised. The findings shed light on key aspects influencing sustainable business practises and their performance effects. The analysis identifies strong statistical correlations and their associated effects. The computed coefficients highlight the significance of a comprehensive strategy to sustainability in the current competitive landscape and offer empirical evidence of the complicated interactions among these variables. The findings show that an improvement in sustainable performance is projected to follow an increase in sustainable intellectual capital. The predicted improvement in sustainable performance is also correlated with a higher degree of sustainable entrepreneurship. The stability of these associations is supported by the positive coefficients in both cases, statistically significant t-statistics, and surprisingly low P-values. The study also clarifies how crucial a role sustainable supply chain management practises play as a mediator. It emphasises it function in mediating the link between sustainable entrepreneurship and sustainable performance, as well as its mediating influence on the relationship between sustainable intellectual capital and sustainable performance. This mediating function emphasises how critical it is to adopt efficient supply chain procedures in order to convert creative and entrepreneurial efforts into observable performance results. This study's conclusions have applications in both academics and practise. In the academic world, they offer actual proof of the connections between these crucial variables and deepen the body of knowledge already in place. The research's practical implications include advice for company leaders and sustainable entrepreneurs on how to best use their efforts in sustainable supply chain management, sustainable entrepreneurship, and sustainable intellectual capital.

Keywords: Sustainable Entrepreneurship, Sustainable Intellectual Capital, Sustainable Supply Chain Management Practices, Sustainable Firm Performance

1. Introduction

Environmental issues include global warming and numerous types of pollution have arisen in the recent ten years as a result of the quick speed of globalisation and industrial progress (Akhtar et al., 2022). Ecological awareness has significantly increased as a result. Due to this, sustainable supply chain management has become a crucial component of sustainability and has recently caught the interest of academics, governmental bodies, nonprofit organisations, consumers, and companies alike (Peng, et al., 2022; Wang, et al., 2022; Burke, et al., 2023). Interestingly, using sustainable supply chain management techniques helps to increase economic growth and corporate competitiveness in addition to reducing environmental harm (Husnah & Fahlevi, 2023). Numerous earlier research (Cousins, et al., 2019,

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Micheli, et al., 2020, Jahanbakhsh Javid, & Amini, 2023) have covered the advantages of sustainable supply chain management practises. There is a noticeable gap in studies examining the firm-specific drivers of sustainable supply chain management practises, despite the fact that much of the prior research has concentrated on the pressures and importance of sustainable supply chain management practises, as well as their fundamental components and outcomes (Karmaker, et al., 2023). The elements that affect organisational decisions on resource allocation and strategic initiatives like sustainable supply chain management practises are not well known, in contrast to the idea of a sustainable entrepreneurial orientation (Fraihat, 2023a). This study explores the connections between sustainable performance, sustainable supply chain management practises, and sustainable entrepreneurship when seen through the prism of dynamic capacities. According to Aghimien et al. (2023), an organization's dynamic capabilities are its highly developed capacity to modify, develop, and alter its organisational capabilities in response to quick environmental changes. These skills improve an organization's capacity for learning and resource repurposing in novel ways to gain a competitive edge and market position. Recognise, seize, and transform are the three main ways they show themselves (Buch-Hansen & Nesterova, 2023). In addition, sustainable entrepreneurship is based on three key characteristics: risk-taking, forward-thinking, and sustainable innovation. As a result, according to Zabelina et al. (2023), the idea of sustainable enterprise is intimately tied to dynamic skills. Wineries can develop the skills necessary to reduce and reuse resources across their production chain in order to strike a balance between environmental protection and commercial gains. In addition to lowering operating expenses, this also gives them a competitive advantage (Manniello et al., 2020). According to the natural resource-based view, environmental conservation-focused resources and capabilities are the main sources of competitive advantage, offering both cost savings and distinctive selling factors (Sehnem et al., 2022). A thorough understanding of sustainable knowledge that includes human, structural, and relational components is necessary to develop these organisational capabilities that are environmentally minded. This range of environmentally conscious knowledge is referred to as sustainable intellectual capital in academics. According to Omar et al. (2019), it is made up of sustainable human capital, sustainable structural capital, and sustainable relational capital. It also comprises the company's collected knowledge that is devoted to environmental preservation. These environmental-related intangible assets provide businesses a number of advantages. Understanding the interaction between the views based on natural resources and intellectual capital is crucial to comprehend these advantages. The idea behind the intellectual capital-based concept is that an organization's intangible assets are crucial for competitive advantage since they are special and difficult to duplicate (Awad Bakry, 2022). Activities that concentrate on environmental improvements at various levels of manufacturing are included in sustainable supply chain management practises (Cousins et al., 2019). This management strategy calls for actions including acquiring environmental certifications from suppliers, creating eco-friendly goods and processes, and coming up with creative sustainable packaging ideas. Effective sustainable supply chain management practises require the integration of organisational skills and sustainable expertise (Kumar et al., 2023). When sustainable supply chain management practices are executed well, it can enhance a company's sustainable performance through operational savings and improved brand image (Kuwornu, et al., 2023). In the wine industry, sustainable supply chain management practices mean environmentally conscious practices in viticulture, winemaking, and distribution. These practices lead to benefits such as lower costs, higher competitiveness, and better market differentiation. While several studies, including those by Habib, et al., (2020), and Afum, et al., (2023) have confirmed the relationship between sustainable entrepreneurial orientation and firm performance, the mechanisms by which sustainable entrepreneurship influences performance remain unclear (Abu-Rumman, et al., 2021). For example, a recent study by Sadiq, et al., (2022) found a positive correlation between sustainable entrepreneurship and corporate economic and environmental outcomes. Understanding how sustainable entrepreneurship affects organisational practises that result in these results, such as sustainable supply chain management practises, appears to be lacking, nonetheless. This implies that there may be a factor that acts as a mediator between corporate orientation and corporate performance. It might not be possible to achieve optimal organisational performance only through an entrepreneurial attitude without this mediator. Pinheiro, et al. (2021) also make the case for a more thorough investigation of the mechanisms through which entrepreneurial orientation affects business performance as opposed to focusing only on a direct correlation. Therefore, this study looked at how sustainable supply chain management practises mediated the impact of sustainable entrepreneurship and intellectual capital on the performance of sustainable firms in Jordan. The following sections of this paper are organized as follows: Section 2 reviews the relevant literature. This is followed by Section 3, which outlines the research framework and presents the hypotheses. Section 4 describes the methodology used and explains the analytical approach. The results are detailed in Section 5, while Section 6 provides a discussion of these results and their broader implications. The paper concludes with Section 7, which summarizes the main points and points out any limitations.

2. Literature Review and Hypotheses Development

In strategic management, resource-based theory (RBT) is a crucial framework that looks at how a company's distinct resources and capabilities affect its competitive advantage and overall performance (Abbasi Kamardi et al., 2022). According to this hypothesis, having access to, using, and integrating resources that are valuable, uncommon,

challenging to duplicate, and non-interchangeable (VRIN criteria) leads to a lasting competitive advantage. The knowledge, abilities, and intellectual resources of a business that support its sustainability initiatives are referred to as sustainable intellectual capital. These can include patents that are sensitive to the environment, novel procedures, and a learning culture (Chumphong, et al., 2020). In order to create long-term value, sustainable entrepreneurship must be able to recognise and seize opportunities that are in line with societal and environmental needs. RBT contends that these ideas can be vital tools for businesses looking for a competitive edge. When valued and uncommon, sustainable intellectual capital and entrepreneurship can result in breakthroughs in products, processes, and business models that improve a company's reputation and point it out from competitors in the market (Salsabila, et al., 2022). These resources can provide a sustained competitive advantage because they are hard to duplicate and cannot be replaced. Additionally, RBT can be used to understand the mediating role that sustainable supply chain management practises play. A sustainable supply chain incorporates eco-friendly practises at every stage of the value chain, from sourcing raw materials to delivering goods to clients. This can involve using ethical suppliers, leaving a smaller carbon footprint, and disposing of waste properly (Battisti et al., 2022). By performance fully deploying sustainable intellectual capital and entrepreneurship throughout the supply chain, a company can create a unique, interconnected system that is challenging for competitors to duplicate (Ogutu, et al., 2023). According to RBT, effective management of these sustainable supply chain practises can transform valuable resources into a lasting competitive advantage. A better brand image, cheaper expenses, increased operational efficiency, and increased consumer loyalty can all result from this (Alzoubi et al., 2022). The study's findings might imply that sustainable supply chain management techniques work as a bridge between sustainable entrepreneurship, sustainable intellectual capital, and sustainable company performance. RBT contends that this mediation takes place as a result of these resources' increased worth, scarcity, and imitable nature as a result of their incorporation into supply chain operations. Consequently, the sustainable competitive advantage of the enterprise is enhanced, leading to improved overall performance.

2.1 Sustainable Intellectual Capital, Sustainable Supply Chain Management Practices and Sustainable Performance

Companies in the modern world care about more than just making money; they want to improve society and the environment as a whole. Within this paradigm, businesses are expected to boost their bottom lines while also minimising any detrimental effects their operations may have on the community (Duque-Grisales & Aguilera-Caracuel, 2021). The term "sustainable human capital" is used to describe the intangible environmental benefits gained by an organization's employees' combined expertise. When it comes to creating a sustainable competitive advantage over the long term, this category of environmental intangibles is crucial since it is ingrained in the knowledge of employees and hence difficult to replicate by rivals (Haldorai et al., 2022). By capitalising on workers' existing expertise in environmental matters, businesses can boost their environmental performance (Paillé et al., 2020). Alavi & Aghakhani (2023) note that a higher level of sustainable human capital is associated with a larger pool of knowledge within the organisation for offsetting negative impacts. To be sure, sustainable human capital does boost environmental efficiency. Saving money and increasing productivity are both outcomes of better resource management in the manufacturing process. An uptick in the economy can have a snowball effect, bolstering the firm's ability to last and, in turn, boosting worker satisfaction by protecting existing employment and opening the door to new ones (Weston et al., 2020). In addition, mutually beneficial partnerships between businesses and their suppliers and consumers can significantly boost an organization's capacity to deal with environmental concerns (Yu, et al., 2020). The sustainable performance of a business can be enhanced through stakeholder collaboration, which can involve the sharing of resources and the development of expertise. Ecological insights can be gained through sustainable resource collaboration, which could lead to better environmental performance. At the same time, it promotes territorial development and offers economic and social benefits due to improved company competitiveness and working conditions. However, it is vital to transform this knowledge into organisational capacities and routines in order to improve environmental management (Ozdemir, et al., 2023), even if personnel have good environmental acumen and businesses maintain solid relationships with stakeholders. Essentially, businesses need to develop their sustainable strategic skills so they can make the most of the environmental expertise their staff members have acquired via their work with various stakeholders. Consolidating environmental knowledge within a corporation can be accomplished through a number of different intangible assets that are part of corporate sustainable management. These include a horizontally organised organisational framework, databases to optimise organisational processes, a company culture focused on sustainability, and a corporate brand aligned with sustainability (Tirabeni, et al., 2019). These intangibles boost a company's social and environmental standing in addition to its economic performance by helping it stand out in a crowded market. This is accomplished by decreasing the amount of raw materials used in manufacturing; furthermore, when employees realise that their employer cares about the environment, they are more likely to take pride in their work and be more productive overall. To address this research gap, and building on an extensive literature review, the following hypothesis is proposed:

H1: There is positive and significant effect of sustainable intellectual capital on sustainable performance

2.2 Sustainable Entrepreneurship and Sustainable Firm Performance

Sustainable entrepreneurship has been defined and discussed using a variety of concepts, all of which stress its connection to social and environmental responsibility as well as sustainable performance. Among these are eco-entrepreneurship (also called ecopreneurship; Arafat & Buchdadi, 2019; Jayasinghe et al., 2021) and sustainable entrepreneurship (Gil-Gomez et al., 2020; Cardeal et al., 2020; Gregurec et al., 2021). The connecting thread across these several definitions is an emphasis on balancing environmental responsibility with the need to turn a profit. Sustainable entrepreneurship is defined by AntolinLopez, et al. (2019) as "innovative practises within organisations that extend to, among other things, the development of products or processes with the intention of achieving profitability while demonstrating a commitment to environmental conservation." Our conceptual framework in this study is consistent with this definition. Sustainable innovation, a subset of sustainable entrepreneurship, emerges as a viable strategy in this setting for both preserving the natural world and maximising profit (LüdekeFreund, 2020). Business practises that prioritise long-term viability while also protecting the environment are examples of sustainable entrepreneurship. The emphasis is shifting, but the ultimate goal of encouraging entrepreneurial activity that makes use of innovation to both address environmental challenges and earn financial rewards remains the same. The importance of businesses in crafting a sustainable and performanceful future is highlighted by this confluence.

H2: There is positive and significant effect of sustainable entrepreneurship on sustainable performance

2.3 Sustainable Supply Chain Management Practices and Sustainable Firm Performance

Within the field of production and operations management, the relationship between sustainable supply chain management practises and business performance has been thoroughly researched and empirically supported (Habib, et al., 2020). Sustainable supply chain management techniques improve economic performance through waste reduction, which lowers waste management costs while reducing environmental risks and preserving energy. Sroufe and Gopalakrishna-Remani (2019) found that sustained internal environmental practises have a significant impact on a number of aspects of company performance, including sales growth, return on assets, pre-tax profits, and cash flows. A thorough meta-analysis by Fraihat et al. (2023b) confirmed that effective sustainable supply chain management techniques and customer collaboration led to improvements in economic performance. Additionally, Yildiz ankaya and Sezen's research from 2019 demonstrated how adopting eco-design principles significantly improves economic performance. By limiting water and energy use, minimising the use of hazardous materials, and decreasing waste generation, effluents, air emissions, and environmental mishaps, sustainable supply chain management practises also improve the wellbeing of employees and communities (Martnez-Bravo, & Martnez-del-Ro, 2019). It has been demonstrated that using eco-design principles improves product functionality, reduces energy usage, lowers waste treatment costs, and therefore lessens environmental consequences over the course of a product's lifecycle (Dahmani et al., 2022). Sustainable supply chain management techniques can help reduce overall environmental footprints by encouraging the development of eco-friendly products through sustainable marketing, sustainable research and development, and environmentally conscious production. Due to a growing awareness of issues like safety, job stability, equity, education, and ethical behaviour in corporate operations (Fraihat, 2023c), social sustainability has recently attracted a lot of attention within the manufacturing industry (Saeidi et al., 2022). The well-being, safety, and societal effects of persons are essentially covered under the scope of social sustainability (Fuchs et al., 2020). Organisations gain regulatory compliance and competitive advantages by integrating social sustainability practises (Santos & Silva Bastos, 2021). According to a study on Malaysian manufacturing companies conducted by Rehman et al. in 2021, sustainable supply chain management practises have a significant impact on social performance. In light of the preceding discussions, the formulation of the following hypothesis is proposed:

H3: There is positive and significant effect of sustainable intellectual capital on sustainable performance

2.4 Sustainable Supply Chain Management Practices as a Mediator

According to Jermsittiparsert, et al. (2019), sustainable supply chain management practises are anticipated to be crucial for preventing pollution and reaching sustainable performance targets. According to Cheng and Shiu (2022), these practises necessitate coordinated organisational initiatives and resource allocation, a factor that can be effectively operationalized through a sustainable entrepreneurial mindset. According to the perspective known as the "Natural Resource-Based View," businesses should strategically implement sustainable strategies to get a competitive advantage (Mishra, P., & Yadav, 2021). These tactics are examples of dynamic entrepreneurial initiatives that are intimately tied to long-term performance gains. Sustainable business practises, which include modern entrepreneurial activities, are a great asset for businesses, giving them particular advantages and boosting their competitiveness. The development of better company performance is not necessarily a result of sustainable entrepreneurship, despite the fact that it embodies a number of entrepreneurial qualities and occupies a decision-making position in the formulation of strategies (Hristov & Appolloni, 2022). Its impact needs to be translated into actual results through actions that can be seen, including sustainable supply chain management techniques. A gap in the literature between sustainable

entrepreneurship and performance is also highlighted (Qalati et al., 2022). According to the resource-based view, it has been discovered that organisational resources and competencies frequently moderate the link between performance and entrepreneurial orientation. For instance, Susanto et al. (2023) discovered that marketing aptitude acts as a bridge between entrepreneurial orientation and performance in innovation. The positive mediating function of organisational learning capability between entrepreneurial attitude and innovation performance was examined by Gomes et al. in their study from 2022. In a different investigation, Habib et al. (2020) discovered a favourable mediation association between sustainable supply chain management practises and organisational performance in the context of market orientation. However, empirical research into the intricate interactions between a sustainable entrepreneurial attitude, sustainable supply chain management techniques, and business performance is lacking. Since the environmental insights that come from employees, the organisation itself, and its relationships with stakeholders all work to promote improved environmental management throughout the value chain, increasing sustainable intellectual capital can act as a catalyst for promoting sustainable supply chain management (Luthra, et al., 2022). As a result, the presence of sustainable intangible assets in a business makes it easier to incorporate environmental considerations into every stage of production, improving sustainability performance. By using environmentally friendly procedures and incorporating technology to lessen the negative effects of conventional supply chain management approaches, improved sustainable supply chain management practises bring value to businesses (Tumpa, et al., 2019). Numerous advantages come from evaluating environmental effects at various production phases, including cost savings and improved brand recognition. Numerous studies highlight the mutually beneficial relationship between sustainable supply chain management techniques and sustainable intellectual capital. Despite the difficulties with information retention, sustained knowledge ownership by employees can over time result in lasting competitive advantages through the development of innovations. Employee sustainable knowledge is essential for the performance of sustainable supply chain management practises, according to Maaz et al. (2022), as it enables the company to address environmental issues, increase the effectiveness of production processes, and promote the creation of sustainable innovations that support the supply chain. As a matter of fact, higher levels of sustainable intellectual capital are correlated with a higher propensity to take part in training pertaining to the organization's environmental management, which in turn boosts the efficacy of the sustainable supply chain management practises. By offering support structures like best practise guidelines, databases, and a decentralised organisational structure, the sustainable intellectual capital itself acts as a basis for environmental activities (Laallam et al., 2020). This group of intangibles encourages senior management commitment to an eco-friendly business culture and the adoption of green best practises. As a result, the application of technological know-how and environmentally oriented knowledge is enhanced by sustainable intellectual capital, which strengthens sustainable supply chain management procedures and thus increases sustainable performance. In order to address the demands of many stakeholders for environmental preservation, businesses must engage in sustainable resource collaboration (Kuo et al., 2022). These intangible environmental assets help to build relationships of trust with important stakeholders and advance organisational understanding of environmental stewardship. By encouraging the creation of environmental innovations based on learned sustainable knowledge across all phases of manufacturing, this can improve sustainable supply chain management practises. The usefulness of sustainable supply chain management practises in boosting economic, social, and environmental performance has been recently demonstrated by research (Li et al., 2020). Recent studies show a favourable association between sustainable supply chain management practises and intellectual capital, as well as the latter's beneficial effects on sustainability performance. This gives a fresh chance to learn more about the interactions between the important variables. Consequently, building on the above discussions, we hypothesize the following:

H4: There is positive and significant effect of sustainable intellectual capital on sustainable supply chain management practices

H5: There is positive and significant effect of sustainable entrepreneurship on sustainable supply chain management practices

H6: sustainable supply chain management practices mediate the effect of sustainable intellectual capital, and sustainable entrepreneurship on sustainable performance

3. Model

The mediating role of sustainable supply chain management practises on the impact of sustainable intellectual capital and sustainable entrepreneurship on sustainable business performance in Jordan is depicted diagrammatically in Fig. 1 of the research model.

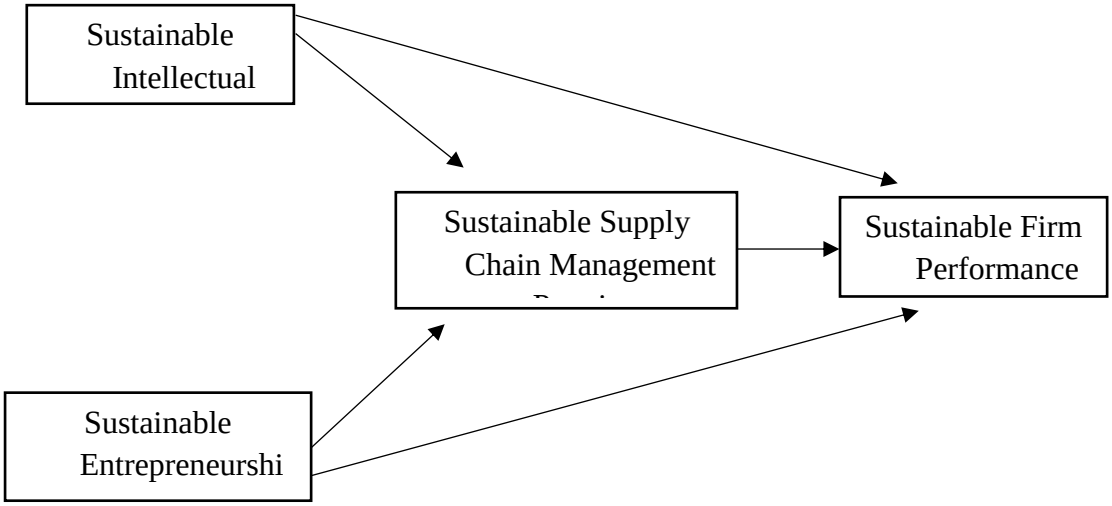

Fig. 1 Model

4. Research Methodology

The researchers in this study gathered data from sustainable entrepreneurs in Jordan using a cross-sectional survey design. Purposeful sampling, a form of non-probability sampling, was used to choose the study's sample population. The sample includes 250 sustainable entrepreneurs in a variety of Jordanian sectors, such as manufacturing, tourism, agriculture, and construction. A questionnaire is used to collect data for the investigation. Sustainable entrepreneurship, sustainable intellectual capital, sustainable supply chain management practices, and sustainable firm performance are all measured by questions in the survey's accompanying questionnaire. The study measures the relevant factors using previously validated scales. Sustainable Entrepreneurship (SE) items was adopted and modified from Habib, et al., (2020), Sustainable Intellectual Capital (SIC) items was adopted and modified from Martínez-Falcó, et al., (2023), Sustainable Supply Chain Management Practices (SCMP) items was adopted and modified from Habib, et al., (2020), and Martínez-Falcó, et al., (2023), and Sustainable Firm Performance (SFP) items was adopted and modified from Habib, et al., (2020), and Martínez-Falcó, et al., (2023) are all measured in this study. Items were rated on a ten-point Likert scale. The survey data was analyzed using PLS-SEM. PLS-SEM is a statistical method that can be used to examine complicated models even when working with a limited data set. Reliability, validity, and goodness-of-fit of the measurement and structural models are evaluated as part of the analysis. The analysis also includes verifying the study's assumptions and looking at the mediating impact of environmental performance in the direct and indirect benefits of sustainable entrepreneurship on sustainable performance. Participants gave their informed consent, and their information was kept private and anonymous. Before administering the survey, the study gets clearance from the appropriate institutional review board.

5. Results and Discussion

5.1 Measurement Model

Internal, convergent, and discriminant validity are all three categories that are investigated. Convergent validity is assessed by computing the average variance extracted (AVE) and composite reliability (CR) coefficients, while internal consistency is assessed using Cronbach's alpha (CA). The Fornell-Larcker criterion is used to evaluate discriminant validity. The dependability of each item was evaluated using Cronbach's alpha coefficients; in accordance with Hair et al. (2022), all variables had alpha values more than 0.70 (Table 1). Additionally, the composite reliability was assessed, and the findings revealed that all variables had reliability coefficients greater than 0.80 (Table 1). Using Dijkstra-rho Hensele values above 0.70 and all AVE values over 0.50 allowed for the assurance of convergent validity (Table 1). All variance inflation factors (VIFs) were below 3.3, indicating that multicollinearity was not significantly problematic. (Table 3). In order to make sure that the study's components can be easily distinguished from one another, discriminant validity was verified using a variety of techniques. The loading values were all more than 0.6, which means that each component is distinct and has its own definition (Table 2). EC1 was excluded from the analysis because of its low factor loading (Hair et al., 2022). The discriminant validity of the construct was established using the Heterotrait-Monotrait ratio (HTMT) method, and the discriminant validity of each component was evaluated using the Fornell and Lacker criterion (Table 4), which compares the square root of AVE from each component to the correlation between constructs. The totals are all less than 0.9. (Table 5) The discriminant validity of the study's components was demonstrated by the significant correlations between the variables that were found by both approaches. Participants were given the assurance that their responses would be kept private and that there was no wrong answer in order to lessen the risk of common method variance (CMV). This study used the Harman's one-factor test (Table 5) to identify the existence of CMV, which involves choosing one component from all components and determining if it accounts for less than 50% of the variation.

The data, which are shown in Table 6, show that CMV explained 44.669% of the variation—just shy of 50%. In addition, Kock (1987) suggested that for a model to be regarded as free of common method bias, the VIFs from a collinearity test should be less than or equal to 5. All structural model components with VIFs under 3 indicated that there was no CMV in this investigation.

Table 1 Validity and Reliability

Variables	CA	CR (rho_a)	CR (rho_c)	AVE
SE	0.866	0.873	0.897	0.594
SIC	0.894	0.910	0.921	0.700
SMP	0.867	0.888	0.882	0.584
SP	0.884	0.886	0.916	0.686

Table 2 Factor Loading

Items	SE	SIC	SMP	SP
SE1	0.788			
SE2	0.782			
SE3	0.798			
SE4	0.798			
SE6	0.720			
SE7	0.734			
SIC1		0.731		
SIC2		0.861		
SIC3		0.858		
SIC4		0.883		
SIC5		0.842		
SMP1			0.654	
SMP2			0.632	
SMP3			0.603	
SMP4			0.739	
SMP5			0.686	
SMP6			0.751	
SMP7			0.781	
SMP8			0.697	
SP1				0.778
SP2				0.884
SP3				0.870
SP4				0.826
SP5				0.776

Table 3 Variance Inflation Factor (VIF)

Variables	SMP	SP
SE	1.098	2.855
SIC	2.297	1.626
SMP	-	2.602

Table 4 The Fornell and Lacker Discriminant Validity

Variables	SE	SIC	SMP	SP
SE	**0.771**			
SIC	0.635	**0.837**		
SMP	0.560	0.542	**0.695**	
SP	0.611	0.474	0.558	**0.828**

Table 5 Heterotrait-Monotrait ratio Discriminant Validity

Variables	SE	SIC	SMP	SP
SE	-			
SIC	0.651			
SMP	0.759	0.715		
SP	0.873	0.82	0.802	-

Table 6 Common Method Bias

C	I.E			E.S.S.L		
	T	% of V	Cum %	T	% of V	Cum %
1	11.167	44.669	44.669	11.167	44.669	44.669

5.2 The Results of the Structural Model Analysis

The SmartPLS structural equation model (SmartPLS SEM), which was utilised to reflect the findings of this study, is described in general in Table 7 and Fig. 2.

Table 7 Path Analysis Result

Path analysis	Estimates	STDEV	T statistics	P values	Decision
SIC -> SP	0.128	0.034	3.759	0.000	Supported
SE -> SP	0.294	0.028	10.48	0.000	Supported
SIC -> SMP	0.356	0.04	8.854	0.000	Supported
SE -> SMP	0.463	0.039	11.855	0.000	Supported
SMP -> SP	0.54	0.025	21.429	0.000	Supported

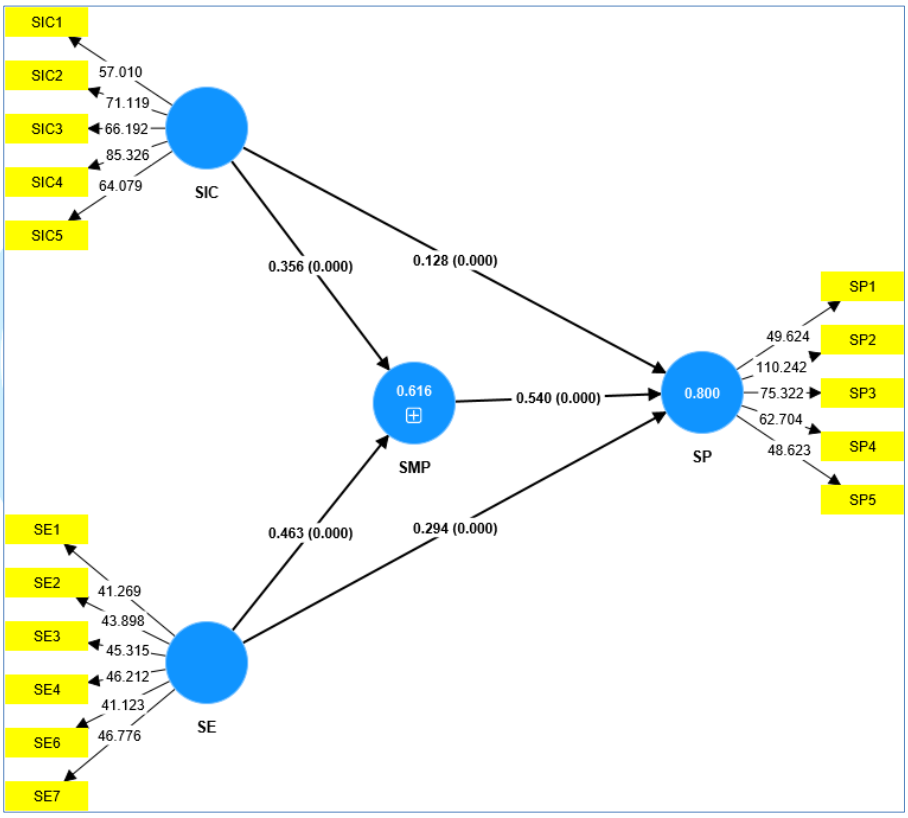

Fig. 2 Graphical Result

The path coefficients, STDEV values, and P values found for each construct in this investigation demonstrate this. The estimated correlation coefficient between sustained performance (SP) and sustained intellectual capital (SIC) is 0.128. This positive correlation shows that an expected rise in sustained performance is linked to a sustained increase in intellectual capital. At a typical significance level of 0.05, the T-statistic of 3.759 is significantly higher than 1.96, yielding a very low P-value of 0.000. As a result, the null hypothesis is disproved and the association between SIC and SP is taken to be verified. The predicted coefficient for the link between sustainable entrepreneurship (SE) and sustainable performance (SP) is 0.294. A higher degree of sustainable entrepreneurship is thought to be linked to an anticipated rise in sustainable performance, according to this positive correlation. The associated P-value is 0.000, and the associated T-statistic is 10.48. The null hypothesis is disproved and the association between SE and SP is proven because the P-value is less than 0.05. The calculated correlation coefficient between sustainable supply chain management (SMP) practises and sustainable intellectual capital (SIC) is 0.356. A rise in sustainable supply chain management practises is anticipated to be correlated with higher levels of sustainable intellectual capital, according to a positive correlation. A P-value of 0.000 is obtained because the T-statistic of 8.854 is considerably higher than 1.96. As a result, the null hypothesis is disproved, proving that SIC and SMP do indeed have a relationship. The estimated correlation coefficient between

sustainable supply chain management practises and sustainable entrepreneurship is 0.463. This positive correlation shows that there is a direct relationship between sustainable supply chain management practises and levels of sustainable entrepreneurship. The corresponding T-statistic is 11.855, and the accompanying P-value is 0.000. The absence of a supported association between SE and SMP is suggested by the low P-value, which also supports the rejection of the null hypothesis. Sustainable performance (SP) and sustainable supply chain management (SMP) are predicted to have a 0.54 correlation coefficient. A higher degree of sustainable supply chain management practises is linked to a forecasted rise in sustainable performance, according to this positive coefficient. With a P-value of 0.000, the T-statistic of 21.429 is substantially higher than 1.96. The link between SMP and SP is thus proven, and the null hypothesis is rejected.

5.3 Mediation Analysis

The current study examines the mediating link in accordance with the recommendations made by Preacher and Hayes (2004, 2008). Through the knock-on effect, the bootstrapping method identified the mediating connection. According to Preacher and Hayes (2008), the indirect impact's 95% boot confidence interval (CI: LL-UL) does not contain a "0" between the variables. Results of evaluating the mediating hypothesis are shown in Table 8.

Table 8 Indirect Method

Path analysis	Estimates	STDEV	T statistics	P values
SIC->SMP-> SP	0.192	0.022	8.617	0.000
SE->SMP-> SP	0.250	0.025	9.869	0.000

Table 8 displays the bootstrap results for the indirect effect, which is significant at p<0.01 (SIC->SMP-> SP). The researcher used the indirect effect of 0.192, 95% Boot CI: (LL= 0.152, UL= 0.237) to further confirm the existence of mediation. According to the research conducted in Jordan, SMP serves as a mediator between SIC and SP in this situation. Table 8 displays the bootstrap results for the indirect effect (SE->SMP-> SP, t=9.869, =0.250, p0.01) using the formula. Based on the fact that the indirect impact of 0.250, 95% Boot CI: (LL= 0.199, UL= 0.301), does not totally fall within the range of 0 to 1, the researcher confirmed that there is mediation. The findings showed that in Jordan, SMP served as a mediator between SE and SP.

6. Discussion

The result of the path analysis shows a significant relationship between sustained intellectual capital (SIC) and sustained performance (SP). The estimated coefficient of 0.128 indicates a positive relationship, which means that an increase in sustained intellectual capital leads to a corresponding increase in sustained performance. This result underscores the critical role of intellectual capital in driving sustainable business performance. The T-statistic, which measures the magnitude of the estimated coefficient relative to its standard error, is calculated as 3.759. To assess the statistical significance of this result, it is compared to the critical value of 1.96, which is typically used at a significance level of 0.05. In this case, the T-statistic significantly exceeds the value of 1.96, indicating that the relationship between SIC and SP is statistically significant. This means that the observed relationship between these variables is unlikely to be due to chance alone. The statistical significance is further underscored by the very low P-value of 0.000. The P-value indicates the probability of the observed result occurring if the null hypothesis were true. A P-value of less than 0.05 (or 5%) is generally considered statistically significant and indicates strong evidence against the null hypothesis. In this case, the P value is significantly less than 0.05, supporting the conclusion that the relationship between SIC and SP is not the result of random variation. Consequently, the null hypothesis stating that there is no relationship between SIC and SP is rejected. The rejection of the null hypothesis has significant implications. It implies that the presence of sustained intellectual capital has a discernible impact on sustained performance. In other words, companies that invest in their intellectual capital and cultivate it in an environmentally and socially responsible manner are more likely to achieve better overall performance. Sustainable intellectual capital includes the intangible assets, knowledge, and experience that contribute to an organization's ability to effectively implement sustainable practices. These may be innovative approaches to resource management, the development of environmentally friendly products, or the implementation of environmentally conscious operations. The positive coefficient indicates that these efforts not only align with sustainability goals, but also translate into measurable improvements in performance outcomes. This result is consistent with the increasing recognition of the value of intellectual capital in a rapidly changing business landscape. As companies come under increasing pressure to operate sustainably, the ability to leverage intellectual resources to drive green initiatives becomes a strategic advantage. The positive coefficient implies that sustainable intellectual capital not only leads to better sustainable performance, but also that the benefits are greater than might be expected from random fluctuations.

The results of the path analysis show a significant and positive relationship between sustainable entrepreneurship (SE) and sustainable performance (SP). The estimated coefficient of 0.294 means that there is a direct relationship between a higher level of sustainable entrepreneurship and an expected increase in sustainable performance. This finding underscores the central role of entrepreneurial activities that prioritize sustainability in shaping better business outcomes. A crucial statistical metric called the T-statistic is estimated to be 10.48. At a significance level of 0.05, the critical threshold of 1.96 is typically utilised, and this result is much over it. The statistical importance of the link between SE and SP is highlighted by the high T-statistic, which shows that random variation is unlikely to be the cause of the observed association. The P value of 0.000 further confirms the statistical significance. The chance that the result would be observed if the null hypothesis were true is indicated by this P-value. The null hypothesis is strongly refuted by a P-value below the usual threshold of 0.05, which is generally regarded as statistically significant. Because the P value in this situation is much lower than 0.05, the null hypothesis should be rejected. As a result, these statistical data support the assertion that sustainable entrepreneurship and sustainable performance are meaningfully and significantly related. The null hypothesis, according to which there is no connection between SE and SP, is disproven. This result has significant implications for both theory and practice. Sustainable entrepreneurship involves the proactive pursuit of sustainable business activities that go beyond simply making a profit and include considerations of environmental and social well-being. This may include innovative development of environmentally friendly products, responsible supply chain practices, or integration of renewable energy sources. The positive coefficient indicates that these corporate actions are not only consistent with sustainability goals, but also provide quantifiable benefits in terms of overall performance. Overall, the T-statistic and P-value support the argument that sustainable entrepreneurship contributes significantly to sustainable performance. This supports the growing recognition that companies that embrace sustainability as a core business strategy achieve a competitive advantage. Organizations that infuse their operations with innovative sustainability-focused practices are more likely to achieve not only better environmental and social outcomes, but also better financial performance. The positive coefficient and its statistical significance also suggest that the benefits of sustainable entrepreneurship go beyond what might be expected by chance. The statistical rigor of the analysis supports the argument that the observed relationship is real and not pretend.

The results of the path analysis unveil a meaningful and positive relationship between Sustainable Intellectual Capital (SIC) and Sustainable Supply Chain Management Practices (SMP). The estimated coefficient, standing at 0.356, suggests that as Sustainable Intellectual Capital increases, there is a projected rise in Sustainable Supply Chain Management Practices. This finding highlights the pivotal role of intellectual capital in shaping sustainable practices within supply chain operations. The statistical significance of this relationship is underscored by the T-statistic of 8.854. This value substantially exceeds the common threshold of 1.96, indicating that the observed association between SIC and SMP is statistically robust and not likely to have occurred due to random fluctuations. Furthermore, the remarkably low P-value of 0.000 strengthens the case for the meaningfulness of the relationship. The P-value signifies the likelihood of observing the obtained result if the null hypothesis were true. A P-value lower than the conventional threshold of 0.05 reflects compelling evidence against the null hypothesis. In this context, the P-value is notably smaller than 0.05, reinforcing the conclusion that the relationship between Sustainable Intellectual Capital and Sustainable Supply Chain Management Practices is supported. These statistical indicators collectively emphasize the statistical and empirical significance of the relationship between SIC and SMP. The rejection of the null hypothesis attests to the presence of a substantial connection between the two variables. This finding has profound implications for both theoretical understanding and practical application. Sustainable Intellectual Capital encompasses the intangible assets, knowledge, and expertise that an organization employs to drive its sustainable practices. This includes innovative ideas for reducing environmental impact, developing eco-friendly products, optimizing production processes, and promoting responsible consumption of resources. The positive coefficient suggests that organizations with higher levels of Sustainable Intellectual Capital are more likely to adopt advanced Sustainable Supply Chain Management Practices. This alignment could manifest as better supplier selection, integration of sustainable sourcing strategies, and the implementation of circular economy principles within the supply chain. This not only enhances sustainability performance but also elevates operational efficiency, minimizes risks, and cultivates a reputation for responsible business practices. The robust T-statistic and the extremely low P-value lend empirical weight to the notion that Sustainable Intellectual Capital significantly influences Sustainable Supply Chain Management Practices. This statistical rigor substantiates the argument that organizations that invest in cultivating their intellectual resources for sustainability are more likely to witness tangible enhancements in their supply chain sustainability practices.

The results of the path analysis indicate a significant and positive relationship between sustainable entrepreneurship (SE) and sustainable supply chain management (SMP) practices. The estimated coefficient of 0.463 indicates that as the level of sustainable entrepreneurship increases, there is a corresponding expectation of improved sustainable supply chain management practices. This finding highlights the critical role of entrepreneurial approaches in shaping sustainable practices within the supply chain. The significance of this relationship is further supported by the T-statistic of 11.855. The fact that this value exceeds the generally acknowledged crucial threshold of 1.96 shows how

statistically robust the link between SE and SMP is and how unlikely random variation's causation is. Furthermore, the low P value of 0.000 supports the relevance of the association. The P value is the probability that the outcome would occur if the null hypothesis were true. Strong evidence against the null hypothesis is provided by a P-value that is lower than the accepted cutoff of 0.05. The P-value in this situation is much lower than 0.05, validating the assertion that sustainable supply chain management practises and entrepreneurial sustainability are related. The importance of the connection between SE and SMP is highlighted by the concordance of statistical markers. The rejection of the null hypothesis confirms that increased sustainable entrepreneurship is indeed associated with improved sustainable supply chain management practices. This result is significant for both academic research and practical application. Sustainable entrepreneurship involves the deliberate integration of sustainability principles into business activities. This includes innovating and developing products, processes, and strategies that minimize environmental impacts while promoting economic viability. In the context of supply chain management, sustainable entrepreneurship promotes practices that emphasize responsible sourcing, efficient resource use, waste reduction, and ethical supplier relationships. The positive coefficient suggests that companies that emphasize sustainable entrepreneurship tend to adopt advanced sustainable supply chain management practices. This orientation may manifest itself in closer collaboration with suppliers, integration of environmentally friendly production methods, and implementation of circular economy principles. The result is not only improved sustainability performance, but also greater operational efficiency, cost savings, and a better ability to respond to evolving consumer demand for sustainable products. The robust T-statistic and very low P-value underscore the empirical importance of the relationship between SE and SMP. These statistical ratios support the practical relevance of the relationship and lend credibility to the argument that companies that invest in sustainable entrepreneurship are more likely to achieve tangible improvements in their supply chain sustainability practices.

The results of the path analysis show a robust and significant relationship between sustainable supply chain management (SMP) practices and sustainable performance (SP). The estimated coefficient of 0.54 underscores that as the level of sustainable supply chain management practices increases, sustainable performance is expected to increase. This finding underscores the paramount importance of effective management of supply chain processes in improving overall organizational performance. The statistical robustness of this relationship is underscored by the high T-statistic of 21.429. This value is well above the commonly used critical threshold of 1.96, underscoring that the observed relationship between SMP and SP is statistically significant and unlikely to be due to random variation. Furthermore, the remarkably low P value of 0.000 supports the argument for the practical significance of the relationship. The P value indicates the probability that the result obtained would occur if the null hypothesis were true. A P-value that is less than the conventional threshold of 0.05 is compelling evidence against the null hypothesis. In this context, the P-value is remarkably less than 0.05, underscoring the conclusion that the relationship between sustainable supply chain management practices and sustainable performance is well established. Together, these statistical indicators underscore the significant empirical importance of the relationship between SMP and SP. The rejection of the null hypothesis means that improved sustainable supply chain management practices are indeed associated with improved sustainable performance. This result is significant for both scientific understanding and practical application. Sustainable supply chain management practices involve the application of environmentally friendly and socially responsible strategies in all supply chain processes. This may include sustainable sourcing, efficient resource use, waste reduction, ethical supplier relationships, and promoting transparency and accountability. The positive coefficient indicates that companies with advanced sustainable supply chain management practices are likely to achieve better sustainable performance results. This alignment can translate into improved operational efficiency, cost savings, reduced environmental impact, and enhanced brand image. Companies that effectively manage their supply chain for sustainability are well positioned to address emerging market trends and consumer preferences for responsible products and services. The robust T-statistic and very low P-value provide empirical support for the proposition that sustainable supply chain management practices have a significant impact on sustainable performance. This statistical rigor supports the assumption that companies that prioritize sustainable practices within their supply chain are likely to achieve tangible improvements in their overall business performance.

According to research, sustainable supply chain management (SMP) techniques are an important mediator between sustainable performance (SP) and sustainable intellectual capital (SIC). According to this mediation, sustainable supply chain management practises serve as a conduit for the impact of sustainable intellectual capital on sustainable performance. The knowledge, expertise, and intangible resources that help organisations create and put into practise sustainable practises are collectively referred to as sustainable intellectual capital. This can encompass creative techniques, strategies that are environmentally friendly, and methods that are ethical. Integrating sustainable practises into supply chain operations ensures that socially and ecologically responsible activities are made at every stage of the value chain. This is accomplished through the use of sustainable supply chain management practises. According to SMP's mediating role, businesses are more likely to embrace cutting-edge sustainable supply chain management techniques when their levels of sustainable intellectual capital are higher. In consequence, these actions have a favourable effect on overall sustainable performance. The research findings imply that the organisational adoption of efficient and ethical

supply chain management solutions is at least partially responsible for the favourable impact of Sustainable Intellectual Capital on Sustainable Performance. In order to achieve real improvements in sustainable performance, it is crucial to operationalize sustainable intellectual capital through sustainable supply chain management practises in addition to fostering it. The research's conclusions highlight how crucial it is to strategically incorporate sustainability principles into many aspects of business operations and supply chain management in order to improve overall performance and advance sustainable development objectives.

In order to bridge the gap between sustainable entrepreneurship (SE) and sustainable performance (SP), the study discovered that sustainable supply chain management (SMP) practises are an important mediator. This implies that the presence of efficient sustainable supply chain management techniques influences and facilitates the relationship between sustainable entrepreneurship and sustainable performance. In order to incorporate sustainability concepts into business operations, sustainable entrepreneurship must be proactive and creative. It entails the creation of environmentally friendly products, ethical sourcing, and socially responsible corporate practises. On the other hand, sustainable supply chain management includes ethical business practises across the whole supply chain, including supplier interactions, manufacturing procedures, and distribution strategies. The mediating role of SMP suggests that companies that exhibit higher levels of sustainable entrepreneurship are more likely to adopt robust sustainable supply chain management practices. These practices then contribute to improved overall sustainable performance. In essence, the positive impact of sustainable entrepreneurship on sustainable performance is channeled through the pathway of effective supply chain management practices. This finding underscores the importance of not only fostering a culture of Sustainable Entrepreneurship, but also operationalizing it through Sustainable Supply Chain Management practices to achieve tangible improvements in Sustainable Performance. The study highlights the strategic importance of integrating sustainability principles into the various stages of the supply chain as a means of improving overall performance and contributing to broader sustainability goals.

7. Conclusion and Implications of the Study

The comprehensive pathway analysis conducted in this study has yielded significant insights into the complex relationships among sustainable intellectual capital (SIC), sustainable entrepreneurship (SE), sustainable supply chain management practices (SMP), and sustainable performance (SP). The results clearly confirm that these variables are interrelated and jointly contribute to the overarching goal of sustainable business performance. The results confirm the positive associations between these variables and reinforce the notion that a holistic approach to corporate sustainability leads to improved performance outcomes. The coefficients and statistical significance provide empirical support and underscore the critical role each variable play in sustainable development. This research expands our understanding of the complex dynamics underlying sustainable business practices and their impacts. The implications of these findings for executive decision making are profound. Companies should recognize the importance of fostering sustainable intellectual capital as it serves as the foundation for sustainable innovation and strategic decision-making. Sustainable entrepreneurship is essential to fostering a culture of innovation and ethical practices, which positively impacts supply chain practices and overall performance. The demonstrated link between sustainable supply chain management practices and sustainable performance underscores the tangible benefits of integrating sustainability into supply chain operations. For practitioners, these findings underscore the value of integrating sustainability into core business functions. Nurturing intellectual capital and promoting sustainable entrepreneurship should be a strategic priority. Companies should invest in training and development programs that empower employees to drive sustainable initiatives. Adopting sustainable supply chain management practices not only supports sustainability goals, but also impacts business performance. In addition, recognizing SMP's facilitation role enhances strategic planning and underscores its importance as a channel for translating sustainability efforts into improved performance outcomes.

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