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Article

Framework for evaluating technological innovation, CSR and ESG performance in Chinese art industrial: A quantitative analysis

Hongchen Liu[1], Jun Cui[2,*]

[1] Chung-Ang University, Dongjak District, Seoul 06974, South Korea
[2] SolBridge International School of Business, Dong-gu, Daejeon 34613, South Korea
*** Corresponding author:** Jun Cui, jcui228@student.solbridge.ac.kr

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Abstract: This research reviews the environmental, social, and governance (ESG) performance of corporate social responsibility (CSR) and technology innovation development, and analyzes the impact of technology innovation on ESG performance and its influencing mechanism. In additional, the main purpose of this study is to gain an understanding the relationships of ESG performance, CSR and technology innovation in Art industry. We found that technology innovation impact CSR of art firm, and ESG performance with the moderating variable of technology innovation has a significant and positive impact on CSR. Likewise, the study is based on primary panel data collected from 161 consumer, product and service manufacturing companies through an electronic questionnaire (Google, Microsoft online survey) with five-point Likert measurement scale. The exploratory factor analysis is proposed to be carried out using IBM SPSS 27.0 and the confirmatory factor analysis (CFA analysis) is proposed to be carried out using SmartPLS.4.0 analysis software, and this study investigate the measurement factors and the reliability of the construct items and to validate the factorial structure of the research variables. Moreover, digital technology and CSR has the potential to contribute to this impact. Based on these findings, we propose relevant ESG performance recommendations to improve technology innovation and CSR. Our findings offer an excited knowing and learning of the impact of ESG performance, CSR and technology innovation in Chinese art industry. Furthermore, this study extends stakeholders theory and Schumpeter's Innovation Theory by proving their utility in the perspective of CSR, ESG performance.

Keywords: ESG performance; corporate social responsibility; technology innovation; the stakeholder's theory and Schumpeter's innovation theory; confirmatory factor analysis

1. Introduction

In the past decade, there has been a growing emphasis on the relationship between technology innovation and Chinese art environmental, social, and governance (ESG) practices and corporate social responsibility (CSR) within Chinese corporations. Some companies like Apple and Qualcomm have highlighted the importance of leveraging technology to drive positive environmental impacts while also promoting innovation and profits. Meanwhile, technological firms have also recognized the role of technological innovation in addressing climate change and enabling sustainability goals. Moreover, research has shown that eco-innovation and corporate waste management play a crucial role in enhancing ESG performance and CSR, with technology innovations serving as a key driver of sustainability efforts. Additionally, the impact of digital inclusive finance factors on Chinese firm's ESG performance has been linked to the improvement of technology innovation, which can help communicate a company's commitment to technology innovation development to

financial investors. Furthermore, studies have explored the mediating effect of environmental protection taxes on enhancing Chinese art ESG performance and technological innovation, highlighting the importance of regulatory frameworks in promoting CSR and technology innovation practices within Chinese art corporations (Acemoglu et al., 2012). Consequently, there is a significant correlation between Chinese's art industry and its technological innovation, as well as its ESG performance (Sun et al., 2023). This program presents a novel approach, whereby the art industry's cultural heritage is embedded in ESG values in order to facilitate sustainable development. Additionally, it demonstrates how the cultural industry can benefit from the influx of new quality productivity enabled by the advent of new technologies. In terms of social responsibility, the works of the art industry also provide support for the recyclable environmental protection concept of Chinese art products, not only in the raw materials of the products. Environmental protection can be reflected in the entire production process, including the use of energy-saving lamps, digital processing technologies, 3D digital printing, and other energy-saving techniques (Tristan, 2023). As well as artificial intelligence (AI) technology has been employed in the field of art cultural heritage protection, offering new avenues for content creation. Besides, its integration with virtual reality (VR) and augmented reality (AR) technologies has facilitated the digital preservation and utilization of art cultural heritage assets, including those pertaining to the Chinese arts and cultural heritage (Lim, 2024). This has opened up unprecedented opportunities for the development of these digital resources, ensuring their art digital ability continued relevance and vitality.

The existing literature on digital technology innovation and its impact on ESG and CSR practices is rapidly expanding. Zhen and Chen (2020) highlight the role of artificial intelligence technology in enabling intelligent production and decision-making, providing support for automatic processes within organizations. Hughes et al. (2021) compare traditional and alternative ESG ratings, emphasizing the low commensurability between the two, showcasing how technological innovation is reshaping sustainable investment practices. Rabbani et al. (2021) delve into the analysis of cryptocurrency from an ESG investment perspective, questioning whether it poses a threat or revolution in achieving ESG goals. Nitlarp et al. (2023) explore the implications of triple transformation on ESG performance in the art sector, emphasizing the use of digital technologies to enhance ESG performance. Li et al. (2023) focus on the impact of digital inclusive some other factors on Chinese corporate ESG performance, particularly in promoting the combination of green development and social and environmental responsibility. Zhao et al. (2023) analyze the relationship between Chinese art firm's digital transformation technology and ESG performance in large manufacturing enterprises, highlighting the mediating role of green innovation. Sun et al. (2023) investigates the relationship between digital transformation and greenwashing in ESG disclosure, emphasizing the importance of investor attention in governing corporate ESG greenwashing behavior. Su et al. (2023) discusses the impact of digital transformation on ESG performance, emphasizing the need for companies to actively develop digital technologies to improve their ESG performance. Fan et al. (2023) explore the mediating role of ESG performance and technology innovation in the application of digital technology and enterprise competitiveness in China. Chang and Wang (2024) study the impact of ESG ratings

on technology innovation in enterprises, using a multi-period differences-in-differences model to empirically test the influence of ESG rating soft supervision on corporate green technology innovation (Yu et al., 2021). Overall, these studies collectively contribute to understanding the intricate relationship between digital technology innovation, ESG practices, and CSR initiatives in various sectors. Despite the scarcity of research on the relationship between Chinese art CSR and technological innovation in the context of perfect ESG performance, as well as the general of primary data on employees' CSR and technological innovation, this study aims to fill the research gap. This study seeks to contribute to this gap by re-examining the relationship between perfect ESG, employees' CSR and technological innovation, and technological innovation as an intermediate variable that influences Chinese art firms' final CSR.

The paper is organized in the following way: Section 2 provides a theoretical framework of ESG performance, CSR and technology innovation in existing approaches to evaluating ESG performance in the artistic industries. Section 3 presents a framework and a hypothesis for assessing the integral circularity index in an art-industrial as a metric for technology innovation, CSR and ESG performance. The next section focuses on the implementation of the proposed framework by analyzing the data and illustrating our hypotheses with an empirical example from the art industry. Section 4 also presents a discussion of the CFA analysis and Goodness fit model analysis, which identified key challenges to improving CSR and technological innovation in an art-industry environment as a standard of ESG performance. Finally, the article's theoretical contribution and practical implications are discussed in Section 5, where we summaries our main findings.

2. Literature review

Attention to CSR and technology innovation in Chinese art firms has received increasing attention in both research hypothesis and best practice, and these studies have contributed to ESG, CSR, and technology innovation knowledge from different perspectives. The focus of this study is on four related strands of literature, namely CSR, technology innovation, and ESG performance in art enterprises. This paper will examine the ways in which companies can enhance their value through the implementation of technology innovation, while simultaneously pursuing corporate social responsibility (CSR) activities and environmental, social, and governance (ESG) performance.

2.1. Theory and hypotheses

This study follows the stakeholder theory, one of the most frequently used theories in the literature for the explanation of the impact of CSR on Chinese technology innovation. It is based on a foundational theory that is widely used in literature to explain how Chinese technology innovation affects CSR. Freeman proposed the stakeholder theory in 1984 to emphasize the creation of brilliant value for stakeholders, which is key point for the success of the Chinese art enterprise (Shad et al., 2019). Based on the stakeholder theory, the business operation of Chinese arts companies is always considered from the perspective of the stakeholder needs

(Freeman et al., 2021). Consequently, the Chinese art companies should consider the stakeholders' needs and have a dialogue with the stakeholders when they have different or opposing business expectations. Drawing on stakeholder theory, Chinese arts companies' CSR helps companies encourage technological innovation in four different ways: through legal and Chinese government regulations, through customers, through employees, and through local arts firms (Padilla-Lozano and Collazzo, 2022). First, Chinese art CSR plays an important role in supporting companies to comply with environmental regulations by adopting environmentally sustainable approaches. This in key contributes to developing technology products, decreasing environment pollution during production processes, and implementing clean energy manufacturing processes (Kashif Shad et al., 2018). Secondly, some of the end users and customers are another key point stakeholder in the companies that are trying to provide Chinese technological innovation, CSR, ESG performance, and environmentally friendly products (Su et al., 2023). Third, the enhancement of Chinese firm's CSR has convinced art firm's employees to behave in an environmentally friendly manner. Finally, local art authorities are very concerned about the activities of Chinese art manufacturing companies because they emit pollution that is harmful to human health and environment. Therefore, the companies will demand that the firms carry out environmentally friendly and meaningful activities. In conclusion, Chinese art enterprises should develop or push forward their art business activities by responding to the demands or concerns of their stakeholders.

In addition, this study cited Schumpeter's innovation theory for analysis. Schumpeter's innovation theory postulates that ESG performance in research and development (R&D) can stimulate technological innovation and enhance a Chinese firm's competitive advantage. Bai and Chen (2022) demonstrated theoretically that environmental regulation encouraged Chinese firms' intrinsic motivation for environmental governance, exerted a catalytic effect on their technological innovation investment, and facilitated the improvement of governance technology. Moreover, a study of the shift from the pollutant discharge fee to an environmental protection tax in China in 2018 by Yu et al. (2021) found that the shift had a brilliant significant promotion effect on the green transformation of heavy-polluting Chinese enterprises. However, there were differences among enterprises with varying characteristics. Furthermore, Huang et al. (2022) contended that an environmental protection tax could stimulate the technological innovation of enterprises, yet the impact would vary depending on the property rights and size of these Chinese enterprises.

Moreover, in recent years, the intersection of environmental, social, and governance (ESG) principles, technological innovation, and corporate social responsibility (CSR) has received increasing attention in a number of arts industries. Consequently, the aim of this literature review is to explore how ESG considerations and technological advances are influencing the CSR practices of businesses, and to delve into the evolving landscape of these concepts within the art industry. Furthermore, this research study proposes a framework for assessing the social impact of art projects through the lens of developing technological innovation and CSR in the art sector, shedding light on how CSR initiatives in the art sector can align with broader societal goals. And Chinese corporate art collecting and corporate social responsibility.

2.2. Hypothesis development

2.2.1. The relationship between ESG performance and technological innovation

Over the past decade, measuring and investing in ESG performance has become a popular trend among a large number of investment community members, department and corporate finance managers (Rabbani et al., 2021). Chinese art ESG performance is art organizational management of the company's carbon footprint and transparent accountability (Shad et al., 2020). Technology innovation concept is defined by Cleff and Rennings (1999) as the promotion of innovation production technologies and best practices to formulate innovations that enhance technological development, taking into account China's ESG performance, environmental and social problem concerns (Zhao et al., 2023). In related prior literature, some terms such as ecological innovation, technological innovation, environmental innovation and Chinese digital innovation are often used interchangeably with innovation (Schiederig et al., 2012). More and more high-tech giants are building top-level ESG structures, upgrading the design of ESG management systems, and promoting responsible and sustainable innovation and development. At the same time, large-scale technology companies are closely following national strategic imperatives and are accelerating to overcome the "stuck" key points of technological frontiers and emerging fields (Su et al., 2023). In the Chinese art sector, Chinese technology innovation improves processes and operations that reflect the ecological design of art products and minimizes the negative effect on the environment. In order to achieve the goal of ESG, CSR development, technology innovation is the R&D process of new products and processes that can improve the value for consumers and businesses, while reducing the negative impact on the environment. To sum up, the following research hypotheses are proposed in this paper:

H1: The perfect ESG performance has a significant positive impact on improving enterprise technology innovation.

2.2.2. The relationship between ESG performance and corporate social responsibility

The Chinese art CSR strategies became more widespread and more technology innovation mature in the 1960s and 1970s, when companies started to recognize the social obligations and the responsibility for the environment in their business activities (Padilla-Lozano and Collazzo, 2022). In terms of the evolution of CSR, Carroll (2021) has reviewed the development of CSR from 1950 to 2020. He observed that CSR has a robust history and an optimistic future, with continuity in support, adaptation and practice by both industry and science. The implementation of CSR and ESG performance has consistently delivered socially responsible activities that have satisfied shareholders and investors alike (Wong and Kim, 2020). Due to its implications, firm's CSR has drawn much support from researchers, activists and administrators in the social and art organizational fields. In summary, this paper concludes by suggesting the following research hypotheses:

H2: Perfect ESG performance will lead to significant improvements in corporate social responsibility.

2.2.3. Mediating effects of technological innovation

Previous evidence has established highly positive associations between corporate ESG performance, corporate CSR and other factors. Based on research conducted by Fan et al. (2023), a robust positive correlation is noted between ESG performance and green technology innovation, which, in turn, corporate social responsibility. Moreover, Chinese art companies with perfect ESG performance reflect their practical efforts in environmental protection, commitment to social responsibility and corporate governance. More specifically, first of all, companies with a perfect ESG performance are likely to attract the attention of investors and financial institutions. Many investors are increasingly interested in ESG factors as an important indicator to assess the long-term soundness of a business (Atan et al., 2018). As a result, perfect ESG performance can significantly enhance a Chinese company's chances of attracting financing (Huang et al., 2023). Second, perfect ESG performance can help to create a positive Chinese corporate image and enhance corporate brand value. Consumers, investors and other stakeholders are more likely to do work with companies that are socially responsible. This generates more business and profits for the company (Lian et al., 2023; Vilanova et al., 2009). Finally, Chinese companies with perfect ESG performance pay more attention to social responsibility. These companies provide a conducive perfect working environment, brilliant training opportunities and social benefits. In summarizing, this paper presents the following major research hypotheses:

H3a: Perfect technology innovation is positively affecting corporate social responsibility.

H3b: There is a meditating effect (technological innovation) between the impact of Chinese CSR and ESG performance, which enhances the role of them on the ESG performance of the Chinese art company.

2.3. Research questions

The researcher identified an apparent knowledge gap in the prior research concerning ESG performance and CSR, in addition, the prior research did not address the subject of technology innovation. This encompasses several unexplored dimensions that lately have attracted research attention in other disciplines. The following research questions are proposed for the development of a valid and reliable multi-item scale for the measurement of public perception of an arts organization's ESG performance, CSR and technology innovation.

RQ1: What is the concurrent reality and validity of the perfect ESG performance scale in relation to the CSR and technology innovation scale?

RQ2: How does technological innovation as an intermediate variable affect perfect ESG performance and CSR in the art industry?

3. Research methodology

Based on the outcomes of the research literature review, we develop a conceptual framework to guide the examination of the relationship between perfect ESG performance, technological innovation and corporate social responsibility in the Chinese art industry.

Define key constructs and variables, such as ESG performance indicators,

technological adoption, and CSR initiatives, to operationalize the conceptual framework. In short, the following **Figure 1** is an illustration of the conceptual research model of this paper.

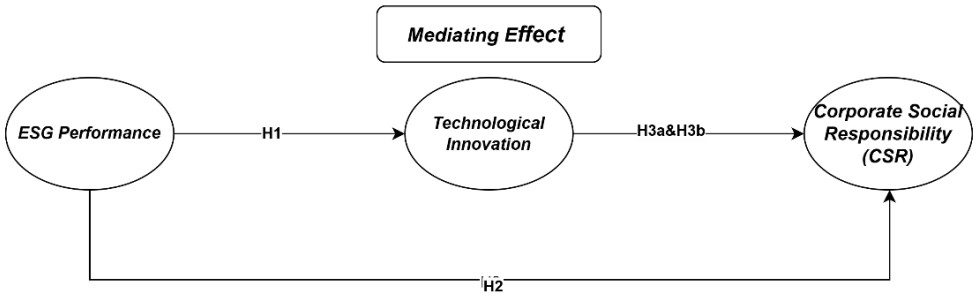

Figure 1. Research model: Technology innovation, ESG performance, and corporate social responsibility of art constructs.
Source: Author's work.

3.1. Sampling and data collection

Furthermore, utilize single-method approach to collect both quantitative data from art organizations, corporations, and stakeholders. Quantitative data collection may involve surveys or structured interviews to assess ESG performance practices scales, technological innovation scales, and CSR activities among art industry participant. Quantitative data collection methods, such as focus groups or case studies, can provide deeper insights into the motivations, challenges, and outcomes associated with ESG integration and technological innovation in CSR practice. Moreover, the items were measured using a five-point Likert scale that ranged from (1) "strongly disagree" or "neutral" to (5) "strongly agree" or "always agree". Additionally, this study paper uses Microsoft's online questionnaire system to design the survey and collect primary data. Likewise, the data collection process comprised the use of carefully designed web-based questionnaires and sampling methodologies. A total of 181 investors agreed to take part in the online surveys (WeChat, WhatsApp group) and, after regular prompting, 163 questionnaires were returned, resulting in a response rate of 90%. The collection of data for this project took 38 days, from 11 March to 19 April. After removing incomplete submissions, 161 complete responses were retained for final analysis. The questionnaire for this study was also designed from previous research scales, with some adjustments to reflect our individual needs.

3.2. Measurement

Adapted from previous research, the scales reported in this paper's survey questionnaire are as follows: The measurement scales that are used for the research variables are as follows: The e-questionnaire items for Chinese firm's CSR are suggested for adaptation by Tiep Le and Nguyen (2022).

Four items are included in this recommended scale for Chinese art firm's CSR measurement. Furthermore, technological innovation is measured by two dimensions: product innovation and the innovation of technological software and hardware. In this context, the Yuan and Cao (2022) scale is recommended for measuring technological innovation, including product technology innovation and software and hardware

technology innovation. This technology innovation scale included three items to measure product technology innovation and software/hardware technology innovation. Regarding ESG performance, Zhao et al. (2023) scale is consequently proposed to be adapted for the measurement of the environment, and the measurement includes six items. Furthermore, measuring Chinese governance disclosure is also proposed by adapting Yuan et al. (2022) scale. A number of modifications can be made to the questionnaire items that have been adapted to guarantee their reliability and validity testing. All the variables are shown in **Table 1**, including the sources for the definition of their variables. Specifically, the study included three variables definition in **Table 1**. The items under each measurement construct have been presented in **Table 2**.

Table 1. Variables definition table.

Name	Definition	Sources
ESG	Environmental performance could be characterised as the integration of environmental policies, mission and structures into Chinese art business practices; social performance can be defined as the impact of a company's discretionary business activities in meeting the demands and expectations of society and external stakeholders; corporate governance performance includes the use of risk control tools, enhancing transparency and accountability, improving rules and regulations.	(Di Simone et al., 2022; Li and Li, 2022)
Technology innovation	Technological innovation mainly includes technological software, hardware technological innovation, and art firm's product technological innovation.	(Zhou et al., 2023)
CSR	Corporate social responsibility (CSR) refers to the way in which a company conducts its business and takes responsibility for the social impact it makes. CSR covers a variety of aspects such as financial sustainability, compliance with legal requirements, ethical standards, and the effect on the environment and society.	(Carroll, 1991; Castka et al., 2004)

Source: Author's work.

Table 2. Measurement constructs and items.

Constructs	Items	Related studies
Environment	ESG1. Art firms use eco-friendly renewable energy (LED light, solar light, etc.) for energy consumption efficiency. ESG2. Art firms uses eco-friendly transportation (hydrogen, electric bus, charging station, etc.)	(Ahmad et al., 2021)
Social	ESG3. Art firms plays a positive role in the community. ESG4. Arts firms supports the creation of various jobs, such as fostering local talent and youth jobs.	(Lee et al., 2023)
Governance	ESG5. Art firms establishes and operates a trusted governance structure for professional management. ESG6. Art firms transparently discloses information about art industry operations to the public.	(Lee et al., 2023)
Technology innovation	TI1. Technological innovation of art enterprises is closely related to R&D development investment. TI2. Technological innovation was helping art companies decrease emissions and sell what their products, and appropriate Chinese art environmental regulation could also complete the "triple effect" of the Chinese ESG environment. TI3. The study confirmed that Chinese art environmental regulation stimulates the intrinsic motivation of the art firm for environmental management and acts as a catalyst for innovation in technology of the art firm and improvements in the technological capabilities for environmental management.	(Li and Li, 2022)
Corporate social responsibility (CSR)	CSR1. Chinese policy for customer safety and confidentiality. CSR2. Establish procedure to comply with customer complaints. CSR3. Offer training and carrier opportunity to its employees. CSR4. Tries to ensure its survival and long-term success.	(Fatma et al., 2014)

Source: Author's work.

4. Findings, data analysis & discussion

Consequently, employ statistical analysis techniques, such as regression analysis, CFA analysis or correlation studies, to examine the relationships between ESG performance, technological innovation, and corporate CSR outcomes. Therefore, the upgrades in the CSR/ESG/technology innovation landscape have highlighted the need for research to examine recent technology innovation developments and CSR in this Chinese art field. Even though several existing reviews have analyzed the social dimension of CSR/ESG instruments and technology innovation in the Chinese art industry, the result shown in **Table 3** reach significance, which indirectly confirms that Chinese art firms are able to implement CSR and technological innovation because of the environmental and social protection rather than the other social policies.

Table 3. Model goodness of fit.

Measure	Saturated model	Estimated model	Threshold
SRMR	0.065	0.065	<0.08
d_ULS	0.382	0.382	-
d_G	1.037	1.037	-
Chi-square	728.400	728.400	-
NFI	0.745	0.745	>0.9

Note: Chi-square value; NFI, Normal fit index; SRMR, standardized root means square residual; d_ULS and d_G value.
Source: Author's work.

4.1. Descriptive analysis: Sample characteristic

This analysis section presents the survey results and demographic characteristics. **Table 4** presents the demographic information of the respondents, which is intended to reflect their investment experience and objectives. The sample is made up of 70.2% men and 29.8% women, presumably representing the views of market investors. 16.8% and 36.6% of respondents are between the ages of 45–50 and 56–60 respectively. Meanwhile, this may reflect the average age of participants in the Chinese art industry. Most responses are likely to come from a mature demographic, indicating a deep understanding of ESG performance, technology innovations and CSR. In terms of education, the majority of respondents are highly educated, with 35.4% holding Master's and MBA degrees and 36% having a PhD. These results indicate that the majority of respondents have a solid understanding of ESG performance, technology innovation and CSR principles, as demonstrated by their age, gender, educational background and professional skills to participate in this study on this research art topic.

Table 4. Respondents' demographic profile (N = 161).

Variables	Category	Frequency	Cumulative percent
Gender	Male	48	29.8%
	Female	113	100.0%

Table 4. (*Continued*).

Variables	Category	Frequency	Cumulative percent
Age	≤30	4	2.5%
	31–35	5	5.6%
	35–40	6	9.3%
	41–45	8	14.3%
	45–50	27	31.1%
	51–60	59	67.7%
	≥61	52	100.0%
Education level	Diploma	1	0.6%
	Dual bachelor degrees	5	3.7%
	College education qualification	13	11.8%
	Undergraduate bachelor	11	18.6%
	MBA	16	28.6%
	Dual Master's	57	64.0%
	PhD.	58	100.0%
Professional level	Junior level	1	0.6%
	Advance level	1	1.2%
	Art professional level	21	14.3%
	Expert	18	25.5%
	Senior expert	32	45.3%
	Non-art level	16	55.3%
	Others	72	100.0%

Source: Author's work.

4.2. Correlations, reliability and validity

In particular, as indicated in **Table 5** and **Figure 2**, there is a positive relationship between Chinese technological innovation, CSR and ESG performance. The findings support hypotheses H1 and H2 and are coherent with the findings of previous literature.

Table 5. Construct reliability and validity.

Constructs and items	Standardized factor loadings	Cronbach's alpha	Composite reliability	AVE	*T*-value	*P*-value
CSR		0.903	0.906	0.775	45.787	0.000
CSR1	0.913				74.921	0.000
CSR2	0.874				40.696	0.000
CSR3	0.838				24.722	0.000
CSR4	0.895				41.165	0.000
ESG		0.949	0.953	0.797	36.911	0.000
ESG1	0.880				32.689	0.000
ESG2	0.954				126.987	0.000
ESG3	0.921				58.983	0.000
ESG4	0.848				31.257	0.000
ESG5	0.884				43.006	0.000
ESG6	0.865				36.771	0.000
TI		0.930	0.932	0.878	2.456	0.014
TI1	0.931				57.435	0.000
TI2	0.940				88.366	0.000
TI3	0.939				66.378	0.000

Note: *** denotes "statistically significant at *p*-value" AVE = "average variance explained", CR = "composite reliability". Source: Author's work.

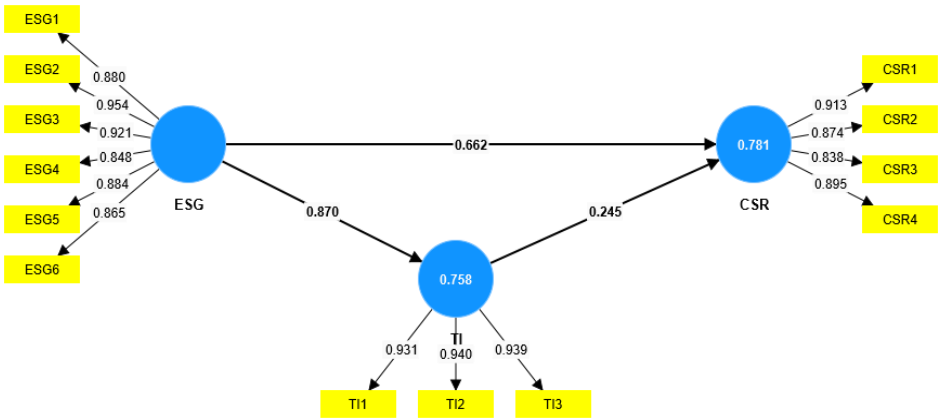

Figure 2. SEM PLS algorithm.

Notes: Values in the construct are composite reliability (CR).
Source: Author's work.

Similarly, as bootstrapping execution in **Figure 3**. The results of the execution show that all of the hypothesis's *p*-values and *t*-values are significant, which in turn supports the hypotheses H1, H2, H3a & H3b respectively.

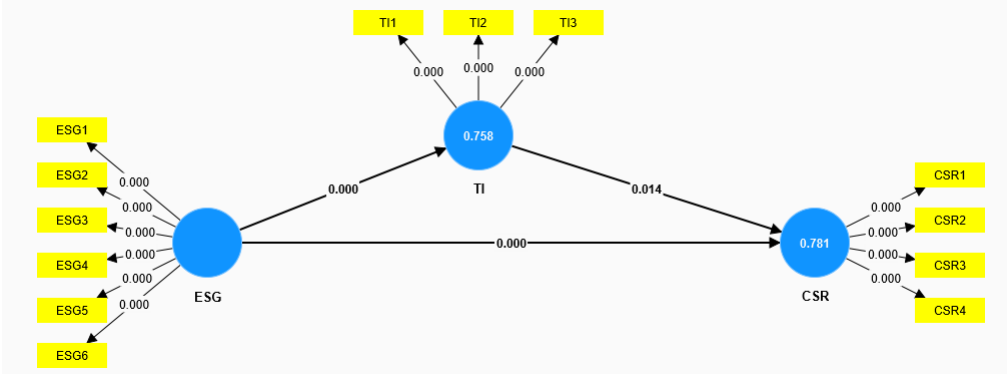

Figure 3. SEM Bootstrapping.

Source: Author's work.

Table 6. Correlations matrix (the square correlation values).

	CSR	ESG	TI
CSR	1.000	-	-
ESG	0.875	1.000	-
TI	0.821	0.870	1.000

Source: Author's work.

Furthermore, the principles and methods of PLS SEM were used to analyses the data set in this research. It is considered to be one of the most powerful statistical methods for testing relationships between variables. Moreover, confirmatory factor analysis (CFA) was used to check the degree of agreement between the set of theoretical factors and the empirical data. This supported the specification and validity of the model, providing some assurance in the conclusions of the study (Hair et al., 2009; Hayes, 2009). Similarly, the research results revealed that technological innovation fully mediates the relationship between ESG performance and CSR, and a meaningful positive relationship was observed between ESG performance,

technological innovation and CSR performance, supporting hypothesis H3. In the meantime, the correlations analysis results are also presented in **Table 6**.

The study conducts reliability (item and internal consistency) and validity tests to determine the measurement of the constructs. Firstly, the study investigates the factor loading values of each individual item, as shown in **Table 5** and **Figure 2**, to judge the internal consistency. The results demonstrated that the load values of all items were above the threshold value of 0.70 (Hair, 2017). Furthermore, the CA and CR values were used to validate the internal reliability of the constructs, and results greater than 0.70 were considered acceptable (Hair, 2017). As the Cronbach's alpha (CA) and Composite reliability (CR) values for all factors were greater than the suggested value of 0.7 (Hair, 2017).

Indeed, goodness of fit was measured using SmartPLS 4.0 software by calculating the standardized root mean square residual (SRMR; 0.065) and the normed fit index (NFI; 0.745). and SRMR values below 0.08 suggest that the data fit the model (Hu and Bentler, 1999; Henseler et al., 2014), while for NFI values (which are between 0 and 1), the closer the value is to 1, and the better the fit (Lohmöller, 1989). Hence, this study can conclude that the model performs well in predicting and testing the all hypotheses.

Furthermore, CFA was utilized to conduct construct validity and was performed using the model fit analysis within the SmartPLS 4.0 software. **Table 3** presents the suggestions of Hu and Bentler (1999). This provided assistance in verifying the suitability of the proposed research model for the study.

Nevertheless, this proposed assessment framework for the composite indicator of CSR and technology innovation in art industrial systems as a measure of perfect ESG performance makes a significant contribution to the theory and research methodology of innovation. The findings highlight the transformative potential of integrating ESG principles and technological innovation in shaping corporate CSR strategies within the arts industry. By proactively integrating ESG principles and adopting innovative technologies, arts organizations and businesses can improve their social and environmental impact while fostering a culture of responsibility, creativity and resilience. These findings provide valuable insights for stakeholders navigating a changing CSR and technology, including ESG performance and technological developments in arts.

4.3. Path analysis and hypothesis testing

In order to examine the proposed hypotheses, the study has applied the PLS SEM method, which is a popular multivariable statistical tool for validating the relationship between research variables. The findings show the paths, beta values (coefficients), *t*-statistics and *p*-values. The SEM results are displayed in **Table 7** and show that ESG performance has a significant impact on corporate social responsibility ($\beta 1 = 0.662$, *p*-value = 0.000), thus supporting H1. Similarly, perfect ESG performance was found to have a significant impact on technological innovation (TI) ($\beta 1 = 0.870$, *p*-value = 0.000), supporting H2. The result of the direct relationship between the mediating variables (technology innovation) supported H3 of a positive significant effect of ESG performance on CSR ($\beta 1 = 0.213$, *p*-value = 0.015) at the 1% significance level. The

results further indicated that if the governance performance is enhanced by 1%, the ESG performance, the technology innovation performance, and the CSR performance will be enhanced by 0.245% and 0.213%, respectively.

Table 7. Path coefficients and final results.

	Path coefficients	**Alpha 5%, power 80%**	**Alpha 5%, power 90%**	***T*-value**	***P*-value**	**Conclusion**
H2: ESG → CSR	0.662	15.000	20.000	7.075	0.000	Support*
H1: ESG → TI	0.870	9.000	12.000	36.911	0.000	Support*
H3a: TI → CSR	0.245	103.000	143.000	2.456	0.014	Support*
H3b: ESG → TI → CSR	0.213	-	-	2.439	0.015	Support*

Notes: * indicates *p*-value < 0.001.
Source: Author's work.

5. Conclusion

The literature reviewed highlights the dynamic interplay between ESG performance principles, technological innovation and corporate CSR practices in the arts industry. As stakeholders increasingly recognize the potential of integrating sustainability considerations and cutting-edge technologies into their business operations, there is a growing need for responsible innovation that promotes both economic growth and social well-being. Future research should continue to explore this nexus, to identify best practices and to address emerging challenges in order to advance the technology development and CSR agenda in the arts sector and beyond.

Our study is based on the public art organization sector in Chinese art enterprises to elucidate the adoption of technological innovation, CSR and ESG performance (Zhen and Chen, 2020). Notes that the conceptual framework for measuring Chinese art industry ecosystems as a measure of ESG performance has certain limitations in the field. The following steps can be taken to improve the proposed framework. Firstly, a larger sample size is recommended in order to improve the degree of generalizability of the Chinese art results obtained. Secondly, in order to enlarge the scope of the study, future research should include not only the national industrial platform, but also art industrial ecosystems at the macro level, as well as arts enterprise. Thirdly, in addition to our efforts to provide a holistic understanding of the Chinese art industrial ecosystem, it seems appropriate that similar studies can be implemented in the future in different industries, for instance in the art construction industry, the Internet industry, the retail industry, and etc.

The contributions highlighted in this review underscore the transformative potential of integrating ESG performance principles and technological innovation in shaping corporate CSR strategies within the art industry (Fan et al., 2023). By embracing sustainability, ethics, and innovation as guiding principles, art organizations and corporations can not only enhance their social and environmental performance impact but also foster a culture of responsibility, creativity, and resilience in the pursuit of a more inclusive and sustainable future (Zhou et al., 2023).

To summarize, this present study suffers from several limitations, which open an avenue for further research. First, although the data was collected from a representative sample of Chinese art firms, the findings cannot be generalized because

of the country specific context. Further testing and validation of the scale in the other countries is needed to prove its reliability. Secondly, the study should be conducted again with a larger and more representative sample. And finally, in the free text field at the end of the survey, many respondents indicated that the survey should have been expanded to include research technology. Finally, research respondents' attitudes towards this technological innovation and CSR could also be recorded in the subsequent work.

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