Transforming CSR into Sustainable Value: The Role of Green Intellectual Capital and Circular Economy

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Abstract

This study empirically examines the relationship between corporate social responsibility (CSR) and sustainable performance by proposing a sequential mediation model incorporating green intellectual capital (GIC) and circular economy (CE) practices. Drawing on the resource-based view, this study posits that CSR initiatives foster the development of environmentally oriented intangible resources, namely green human, structural, and relational capital, which collectively constitute GIC. Data were collected from large manufacturing firms, and the proposed model was tested using partial least squares structural equation modeling (PLS-SEM). The findings posits that the transition from CSR to sustainable performance is not direct but occurs through the development of GIC, which in turn facilitates effective CE implementation. By embedding circular practices, firms can achieve long-term environmental stewardship, economic viability, and social value creation. The framework contributes to sustainability literature by integrating CSR, knowledge-based resources, and circular strategies into a unified pathway toward sustainable performance. It also offers practical insights for managers and policymakers seeking to leverage responsible governance and green capabilities to drive competitive advantage while addressing global sustainability challenges.

Keywords: Green intellectual capital, Circular economy, Sustainable performance, Corporate social responsibility

1. Introduction

The discussion about sustainable development is now focusing more on how companies take care of environment (Silvestre et al., 2019; Young et al., 2006). Today, managers understand well how environmental problems are connected to business activities (Wong et al., 2021). To make sure the environment is safe, companies are taking steps to protect and preserve it as a part of their business plan (Moktadir et al., 2020). Businesses' decision-making and future planning have been influenced by the growing consciousness of customers towards the environment (Panda et al., 2020), eco-friendly monitoring (Borsatto et al., 2021), ethical responsibilities to society (Afsar et al., 2020), and corporate environmental practices (Martin et al., 2023). These changes have made businesses want to create new and environmentally friendly products and improve how well their business does (Awan et al., 2021; Zhu et al., 2007).

CSR supports a company in thinking about how its action effect the environment and finding ways to reduce any negative effects (Bhattacharya et al., 2010). It can help the environment by reducing air pollution, saving materials, reducing trash, and protecting nature (Suska, 2021). Nonetheless, it is vital to acknowledge that the consequences of CSR can significantly differ depending on the particular actions and policies implemented by a company (Bager et al., 2020; Zhou et al., 2020). Studies conducted previously have explored how CSR practices contribute to gathering essential recourses (Reverte et al., 2016) and enhancing stakeholder contentment (Flammer, 2013). By integrating sustainability into its operations, a company displays its desire to be a responsible corporate entity (Dahlsrud, 2008). The integration of corporate social responsibility (CSR) and green intellectual capital (GIC) in business can empower companies to effectively prioritize circular economy and take action towards environmental and social concerns. Gaining and retaining customers and fostering long-term business prosperity are some of the advantages that can arise from this (Marco-Lajara et al., 2023; Mehmood et al., 2022).

According to Mehmood et al. (2022) companies that strongly prioritize corporate and social responsibility tends to have more valuable environmental-friendly assets. Their research indicated that involvement in CSR activities can foster the development of green intellectual capital. Chen and Chang (Chen et al., 2013) pointed out that companies that prioritize CSR tend to make investment in training and development programs, which can significantly enhance their green

intellectual capital. According to another study, companies that prioritize their environmental sustainability are more persuaded to allocate financial resources for research and development focused on eco-friendly products and practices. Consequently, this leads to a greater number of green innovations and enhanced environmental practices in general (Yong et al., 2022). Moreover, companies that give importance to protecting the environment usually have better levels of GIC. This can result in their business to be more sustainable (Wang & Juo, 2021). The impact of promoting eco-friendly practices and encouraging environmental ideas on small manufacturing businesses in Pakistan was investigated in relation to the development of the new inventions. The research indicates that GICs plays a significant role in driving the implementation of circular economy within the manufacturing industry (Ali et al., 2021)

Ullah et al. (2022), underlined that how important it is to consider certain factors that can impact the long-term success of the business. Having knowledge and skills about the environment and being able to use them in business helps make the business last longer. However, their research has not investigated the linkage between large manufacturing companies, specifically in relation to CSR, GIC, and CE. This study focuses on examining how the relationship between CSR and green intellectual capital affects the development of eco-friendly products and the long-term achievement in large manufacturing firms of Pakistan.

One area that uses a lot of energy and could produce a lot of carbon dioxide in industrial manufacturing (Li et al., 2020). To lower pollution, this sector needs to work on creating rules that protect the natural world. Some researchers believe that advancement in technology can help create new ways to protect the environment and make businesses more successful, without causing pollution (Lee et al., 2015; Yusliza et al., 2019). Manufacturing companies should focus on CSR and GIC to achieve environmental sustainability. This current study wants to test the relationship between CSR, GIC, CE, and SP. Researchers have never looked into this relationship before (Malik et al., 2020).

The main focus of this study is to address three specific questions that necessitate investigation.

- How does CSR impact green intellectual capital?
- Does GIC enable circular economy practices?

- Does circular economy have effect on sustainable performance?

This research contributes to the current environmental management studies by investigating the interrelationship between CSR, GIC, CE, and SP. Previous research used institutional theory (Wang et al., 2021), and social exchange theory (Ullah et al., 2022). This study is about using the resource-based view to look at certain things in an organization that are important for doing well and being better than competitors. It is important to understand how CSR affects the knowledge and resources of an organization. This understanding is critical for encouraging eco-friendly innovation and ensuring the long-term success of the business. (Wang et al., 2021; Bahta et al., 2021).

Companies are not only focusing on protecting and preserving the environment, but also on minimizing their impact on it. They are actively seeking ways to reduce their carbon footprint, minimize waste generation, and conserve resources. By implementing sustainable practices and adopting eco-friendly technologies, companies can significantly minimize their environmental impact. It is inspiring to see businesses taking responsibility and working towards a more sustainable future. Corporate social responsibility (CSR) holds immense importance for companies. It entails reducing environmental and social impacts through responsible business practices. By integrating sustainability into their operations, companies can demonstrate their commitment to being responsible corporate entities. This can have a positive impact on various aspects, such as reducing air pollution, conserving resources, minimizing waste, and protecting the environment. Additionally, the integration of CSR and green intellectual capital (GIC) empowers companies to prioritize the circular economy, attract and retain customers, and ensure long-term business prosperity. Companies that prioritize CSR often possess valuable environmentally friendly assets and invest in green intellectual capital. By promoting eco-friendly practices and fostering environmental ideas, the manufacturing industry can drive the implementation of the circular economy. This research delves into the correlation between corporate social responsibility (CSR), green intellectual capital (GIC), circular economy (CE), and sustainable performance (SP) within the context of environmental management. It adopts the intellectual capital-based view theory to examine how CSR influence an organization's knowledge and recourses, ultimately

fostering innovation in eco-friendly practices. By understanding these relationships, businesses can better comprehend the impact of CSR on their overall social and environmental progress.

2. Literature Review

2.1. Resource Based View

Previous research distinguished between the CSR concept's antecedents and outcomes. In the first perspective, institutional theory and stakeholder view theory are mostly utilized when research is depending on CSR's predecessors (Pan et al., 2021). Second, the RBV theory was used in research projects that looked at the effects of corporate social responsibility. Furthermore, rather than focusing just on creating a competitive advantage, the RBV also suggests that organizational, human, and physical resources should be developed, combined, and deployed in a way that creates unique value and is challenging for competitors (Barney et al., 1991). Previous research has also demonstrated the strong connection between RBV and green intellectual capital, with RBV stating that it seeks to critically identify, acquire, value and safeguard the vital resources for organization's productivity (Spender et al., 1996). Also, RBV's attributes recognize that it improves the company's performance and helps businesses succeed (Ahmad et al., 2003; Ray et al., 2005). Above all, proactive corporate environmental measures by organizations that went above and beyond regulatory compliance were recognized as valuable organizational capabilities as a mediating variable with RBV theory (Russo et al., 1997; Sharma et al., 1998). Additionally, scholarly research suggests that an organization's environmental performance is positively correlated with its ability to adapt and change (Judge et al., 2005). Thus, this indicates that an organization's resource commitment is crucial for measuring the anticipated results of CSR. Furthermore, prior research has recognized that an organization's dedication to its financial performance reveals improved performance (Bacinello et al., 2020) and environmentally innovative practices (Pan et al., 2021). Likewise, it was discovered that CSR tactics were important for building skills and enhancing a company's sustainable performance (Shen et al., 2019). Moreover, Yusliza et al. (2019) found that putting CSR strategies into practice promotes an organization in embracing green intellectual capital which turns into the valuable, distinctive, and non-replaceable resource. Consequently, the RBV is appropriate given the research questions, which focus on the relationship between CSR, green intellectual capital and sustainable

performance dimension. According to the RBV, a company can obtain a competitive edge by utilizing corporate social responsibility (CSR) as a strategic asset that is valuable, non-replaceable, and unique. The study further suggests that an organization's capacity to create unique and uncommon resources to improve the property's sustainability performance is known as green intellectual capital.

2.2. Corporate social responsibility and green intellectual capital

CSR was built on the principles of environmental management and corporate social responsibility. Corporate Environmental Responsibility (CER) is an essential and distinct part of CSR (Rahman et al., 2012). According to Mazurkiewicz et al. (2004) CER involves examining a company's operations, products and establishment in relation to their environment. Companies supporting CSR decrease asset consumption and carbon dioxide outflows, executing eco-friendly procedures that have negligible negative affect on the sustainability performance (Bacinello et al., 2021; Kraus et al., 2020). CSRs are moreover characterized as naturally dependable business practices that go above and beyond administrative commitments and acknowledge obligation for any unfavourable external impacts of their operations (Chuang et al., 2018). Consequently, green intellectual capital describes the skills, knowledge and creativity that a business possesses in a relation to environmental sustainability (Dangelico et al., 2010). Environmental sustainability can be influenced by various factors, such as the advancement of new green technologies and employee competencies and expertise (Baima et al., 2021). Previous researches have demonstrated beneficial relationship between CSR and GIC (Chuang et al., 2018; Baima et al., 2021). Scholar have contended that organization dedicated to ecological accountability are inclined to allocate resources towards Green intellectual capital, as this can facilitate them in acknowledging and executing more sustainable methodologies (Hsu et al., 2009; Bhattacharyya et al., 2020). Additionally, green intellectual capital can assist a business in reducing its environmental impact more successfully by offering the knowledge and skills required to recognize and put into practice the most efficient sustainability measures. To put it briefly, CSR and GIC's assistance can assist companies in implementing green innovation and achieving business sustainability.

Academic studies have endeavoured to propose diverse precursors out comes of environmentally conscious intellectual capital. In reference to the factors, academic contends those businesses

embracing greater degrees of corporate social responsibility would be more aware of and willing to participate in programs for environmental management. To create green intellectual capital, they would act more responsibly (Astuti & Datrini et al., 2021; Chang & Chen et al., 2012; Sudibyo & Sutanto et al., 2020). The necessity of creating policies to handle the ethical concerns of all stakeholders is emphasized in current CSR talks (Zompras & Siakas et al., 2015).

Rather, a plan for defending human rights and revolving moral, environmental, and social challenges should be developed together with all parties involved. Stakeholders in the areas of employees, the community, consumers, suppliers, investors and the environment were identified in the stakeholder approach to corporate social responsibility that was introduced by Papasolomou-Doukakis ,Kapadis- and Katsioloudes in 2005. It is theoretically possible to suppose that there is relationship between CSR and green intellectual capital given their respective natures. In order to give the businesses a significant competitive edge, addressing both could have a multiplier effect (Gallardo-Vázquez et al., 2019). Moreover, companies that actively pursue corporate social responsibility initiatives would have greater capacity because they would have a deeper comprehension of the environment and be able to develop the necessary technologies (Qiu et al., 2020; Song et al., 2019).

Better Organizational legitimacy, can also be attained through CSR and green intellectual capital when it comes to morals, governance, internal workforce management and, other commercial operations. A study in 2017 by Jain, Vyas and Roy based on a sample of 384 Indian businesses confirmed the beneficial impact of CSR on businesses performance and intellectual capital. Chang & Cheng's (2012) study which examined Taiwanese businesses, also found that Corporate social responsibility had a favourable impact on green intellectual capital, furthermore there was a partial meditation effect of environmental consciousness on the connection between CSR and the three components of green intellectual capital. Hence this study hypothesizes that:

H1a. CSR has a positive influence on green human capital.

H1b. CSR has a positive influence on green relational capital.

H1c. CSR has a positive influence on green structural capital.

2.3. Green intellectual capital and circular economy

This research has maintained that GIC acts as a mediator between CSR and CE and is one of the factors that influence CE behavior, as demonstrated by the empirical data that is currently available (Jirakraisiri et al., 2021; Shoaib et al., 2021; Yong et al., 2020). A company manages GIC as a group of intangible knowledge assets (skills, competencies and capabilities) with the goal of enhancing environmental performance (Abd et al., 2022). GIC is the body of information that a company possesses to support environmental management and provide it a competitive edge over rivals (López-Gamero et al., 2011). Intangible assets under GIC include the company's relationships, knowledge, and skills. Companies can enhance their environmental management due to these assets since they are hard to replicate (Chen, 2008; Sheikh, 2022; Xi et al., 2022). These intangible assets help businesses become more creative and adapt their methods to be more environmental friendly. As a result, businesses with higher GIC encourage their staff to use reusable materials and promote the use of renewable energy sources that will have the least amount of adverse environmental effects (Giudice et al., 2021; Jinru et al., 2021; Wang & Juo, 2021). GIC regarded in this study as a variable that affects CE intention. "Green intellectual capital represents a company's intangible assets, including knowledge, skills, experience, and innovation in environmental protection," according to (Huang and Kung et al., 2011). Additionally, GIC describes how an organization uses its connections, knowledge, abilities, and expertise to protect the environment (Amores-Salvadó et al., 2021; Ali et al., 2021; Wang & Juo, 2021).

One of the most important traits that people should have amid environmental degradation is green intellectual capital (Bag et al., 2019; Gupta et al., 2019). Green Intellectual capital entails the abilities, skills, knowledge and experiences of persons who are used to implement the green practices. The green intellectual capital is the summation of employee's knowledge, skills, attitude, wisdom, creativity etc. about environmental management and environmental concern (Khan et al., 2020; Daddi et al., 2020). Katz-Gerro et al. (2019) and Lopez Sintas et al. (2019) contend that MSMEs with dynamic capacities may function more nimbly, giving them greater resilience during difficult times and allowing them to adopt access and improve CE systems. Hence, we formulate that:

H2a. Green human capital has a positive influence on circular economy.

H2b. Green structural capital has a positive influence on circular economy.

H2c. Green relational capital has a positive influence on circular economy.

2.4. Circular economy and sustainability performance

In addition to being a desirable concept, CE has been shown to facilitate the accomplishment of the sustainable development goals and to raise industry and government awareness and readiness to act (Schroeder et al., 2019). Environmental protection laws on reduction, reuse and recycling (3Rs) are incorporated into CE at the corporate level, with an emphasis on fulfilling environmental as well as goals for economic performance (Zhu et al., 2010). CE is considered to play a significant role in sustainability (Geissdoerfer et al., 2017; Rodríguez-Espíndola et al., 2022). The latter has more expansive, open-ended goals based on the stakeholders and their individual interests, whereas the former concentrates on minimizing input, waste, and emission levels (Geissdoerfer et al., 2017). CE is a paradigm for business that demands innovative approaches to planning and carrying out businesses (Bocken et al., 2016). By executing the 3Rs, this restoring and regenerating model seeks to improve the efficiency of both production and consumption (Ghisellini et al., 2016). The outcomes of CE based manufacturing systems linked to sustainable operations include resource circularity, the use of natural resources and product longevity (Gupta et al., 2019; Bai et al., 2020). In order to move society closer to greater sustainability, CE has developed into a revolutionary paradigm that enhances the economic, environmental, and social aspects of businesses collaboration from all parties involved (Dey et al., 2020). According to academics and practitioners, aspects of economic and environmental sustainability are inadvertently included in CE (Calisto Friant et al., 2020). According to a qualitative study of 155 businesses in the Netherlands and Italy, the majority of the top companies see circular economy as a significant tool for achieving better sustainability performance, particularly in the environmental area (Walker et al., 2022).

The term sustainable performance (SP) describes the creation of goods with environmentally friendly methods that minimize adverse effects on the environment (Yadav et al., 2020; Luthra et al., 2020). Energy research, mechanical engineering, environmental science and industrial science are all seeing an increase in the use of sustainable performance (Vivek et al., 2020). The circular

economy addresses important issues including resource and environmental protection while offering opportunities for sustainable development and growth (Gonçalves et al., 2022). Jabbour et al. (2019) and Luiz et al. (2019) observed that manufacturing companies have a significant and rapid impact on the environment and non–renewable energy resources. As a result, immediate action is needed and an idea of circular economy provides a workable solution. Utilizing circular economy capabilities may be the best achieved through sustainable production (Bag et al., 2020). The degradation of materials and resources is a major concern for all nations worldwide (Lie et al., 2018; Feng et al., 2018). Irfan et al. (2021) and Ahmad et al. (2021) further reveals that sustainable performance one of the key components in influencing businesses.

H3. Circular economy has a positive influence on sustainability performance.

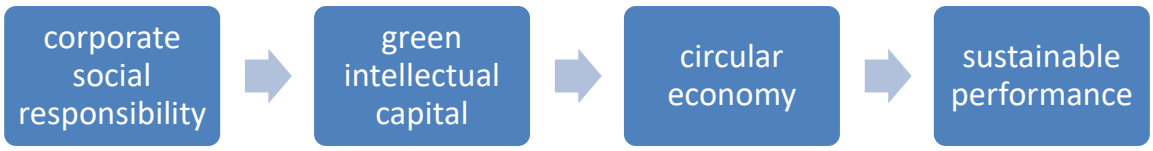

Figure 1: Theoretical Framework

3. Research Methodology

This study adopts a quantitative research design to examine the proposed model linking corporate social responsibility (CSR) to sustainable performance through green intellectual capital (GIC) and circular economy (CE) practices. A cross-sectional survey method is employed to collect primary data from organizations engaged in sustainability initiatives. Data was gathered from large manufacturing firms listed on stock exchange of Pakistan using a structured questionnaire adapted from previously validated scales in the literature. In the first round of data collection only 127 complete questionnaires were received back out of 210 from February to April. While in second round 103 questionnaire were received back out of which 7 incomplete questionnaires were discarded as it were not completed properly. Hence, a sample of 223 was utilized for data analysis. Data was analyzed via Partial Least Squares Structural Equation Modelling (PLS-SEM) is employed. This technique is suitable due to its ability to handle complex models, latent constructs, and non-normal data distributions. The analysis proceeds in two stages: assessment of the measurement model and

evaluation of the structural model. Reliability is examined using Cronbach's alpha and composite reliability, while convergent validity is assessed through factor loadings and average variance extracted (AVE). Discriminant validity is evaluated using the heterotrait–monotrait ratio (HTMT). The structural model is then tested to examine path coefficients, explanatory power (R^2), effect sizes (f^2), predictive relevance (Q^2), and the significance of mediating effects through bootstrapping procedures.

4. Results

Table 1 presents the assessment of internal consistency reliability and convergent validity for all study constructs using composite reliability (CR) and average variance extracted (AVE). The results indicate that the measurement model demonstrates satisfactory reliability and validity as all the values of CR are above that 0.7 (Hair et al., 2009), moreover, all the values of AVE are greater than 0.5 (Hair et al., 2009), hence meets the threshold criteria.

Table 1: Construct reliability and validity

	Composite reliability	Average variance extracted (AVE)
CSR	0.844	0.530
Economic performance	0.803	0.508
Green relational capital	0.844	0.645
Social performance	0.892	0.734
Circular economy	0.873	0.699
Environmental performance	0.882	0.714
Green human capital	0.763	0.527
Green structural capital	0.821	0.535

Table 2 elucidate the values of HTMT in which it can be seen that all values are less than 0.90, according to Henseler et al. (2015), the values of HTMT less than 0.90 indicate that the measures have well established discriminant validity.

The structural model results in table 3 indicate that all hypothesized relationships are positive and statistically significant, as evidenced by high t-statistics and p-values below 0.001. These findings provide strong support for the proposed framework linking corporate social responsibility (CSR),

green intellectual capital components, circular economy practices, and sustainable performance outcomes.

Table 2 HTMT

	CSR	Economic performance	Green relational capital	Social performance	circular economy	Environmental performance	Green human capital	Green structural capital
CSR								
Economic performance	0.556							
Green relational capital	0.788	0.428						
Social performance	0.757	0.682	0.651					
circular economy	0.837	0.455	0.638	0.574				
Environmental performance	0.795	0.488	0.699	0.728	0.735			
green human capital	0.854	0.629	0.736	0.897	0.769	0.800		
Green structural capital	0.402	0.234	0.383	0.299	0.532	0.715	0.418	

First, CSR demonstrates a strong and significant influence on all three dimensions of green intellectual capital. The effect of CSR on green relational capital is the strongest ($\beta = 0.634$, $t = 14.586$), indicating that socially responsible firms are more likely to develop environmentally oriented relationships with stakeholders such as customers, suppliers, and communities. CSR also has a substantial positive impact on green human capital ($\beta = 0.566$, $t = 14.697$), suggesting that responsible organizations invest in employees' environmental knowledge, skills, and awareness. Additionally, CSR positively affects green structural capital ($\beta = 0.371$, $t = 6.642$), implying that CSR initiatives contribute to the development of supportive organizational systems, policies, and processes for environmental management.

Second, all components of green intellectual capital significantly enhance circular economy practices. Green human capital shows the strongest contribution ($\beta = 0.328$, $t = 5.771$), highlighting the critical role of employee competencies in implementing circular initiatives. Green relational

capital also positively influences the circular economy (β = 0.304, t = 5.353), reflecting the importance of collaboration with external stakeholders for resource recovery, recycling, and sustainable supply chains. Green structural capital exhibits a positive but comparatively smaller effect (β = 0.248, t = 4.790), indicating that organizational systems and infrastructure also support circular implementation.

Finally, circular economy practices have a substantial positive impact on all three dimensions of sustainable performance. The strongest effect is observed on environmental performance (β = 0.599, t = 15.804), confirming that circular strategies are highly effective in reducing waste, conserving resources, and minimizing environmental impact. Circular economy adoption also significantly improves social performance (β = 0.491, t = 11.067), suggesting benefits such as enhanced stakeholder well-being, corporate reputation, and community engagement. Moreover, it positively influences economic performance (β = 0.400, t = 7.795), demonstrating that circular practices contribute to cost savings, efficiency gains, and long-term profitability.

Overall, the results support the sequential logic of the model: CSR fosters the development of green intellectual capital, which enables the adoption of circular economy practices, ultimately leading to improved environmental, social, and economic performance. These findings underscore the importance of integrating responsible governance, green capabilities, and circular strategies to achieve comprehensive sustainable performance.

Table 3 Hypotheses Results

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
CSR -> Green relational capital	0.634	0.636	0.043	14.586	0.000
CSR -> Green human capital	0.566	0.568	0.038	14.697	0.000
CSR -> Green structural capital	0.371	0.381	0.056	6.642	0.000
Green relational capital -> Circular economy	0.304	0.302	0.057	5.353	0.000
Circular economy -> Economic performance	0.400	0.409	0.051	7.795	0.000
Circular economy -> Social performance	0.491	0.493	0.044	11.067	0.000
Circular economy -> Environmental performance	0.599	0.601	0.038	15.804	0.000
Green human capital -> Circular economy	0.328	0.33	0.057	5.771	0.000

Green structural capital -> Circular economy	0.248	0.252	0.052	4.79	0.000

5. Discussion

The current study aims to analyse the impact of CSR, GIC, CE and sustainable performances. The study's conclusions showed that all three GIC components (GHC, GRC, and GSC) are significantly influenced by CSR. These results support the earlier study's conclusion that CSR has a major impact on GRC, GHS, and GSC (Baima et al., 2021). Researchers suggested that companies with a stronger environmental focus would devote more funding to green management initiatives (Elliot et al., 2013). Researchers also indicated significant association between GIC and perceived CSR, indicating that GIC investment may be useful in strengthening organisational strategies that emphasize CSR (Fleischman et al., 2008). The work of Chang and Chen (2012) and Chen (2008) served as the model's primary sources of inspiration. The research also recognises the contributions made to the model by other scholars in related fields, such as green intellectual capital (Huang & Kung, 2011; Delgado-Verde et al., 2014). CSR is recognised as a specialized asset that relates to enhancing the economic value of another significant asset such instance GIC (Public et al., 2004).

Next, the findings reveal that GIC strongly influences CE. This result is supported by previous studies that established the positive link between GIC and CE (Marrucci et al., 2021). According to the research, managers and staff members of an organisation are more likely to participate in circular economy initiatives if they have green dynamic capabilities, such as environmental preservation motivation and awareness. Reduction, reuse, and recycling, or the 3Rs, are applied within organisations and are considered a dynamic capability made up of interconnected CE initiatives with a common goal. Furthermore, green intellectual capital has a significant effect on CEI behaviour which is in agreement with prior studies (Syed et al., 2022; Khalil et al., 2022). The study has also demonstrated that GIC acts as a medium for the potential indirect influence of green culture on CEI behaviour. According to Abd et al. (2022), GIC offers a set of intangible knowledge assets (skills, competencies, and capabilities) that a company manages in order to promote environmental performance. This finding is consistent with previous studies and is supported by the recent empirical evidence (Jiao et al., 2022; Jirakraisiri et al., 2021; Sheikh, 2022; Xi et al., 2022). Furthermore, GIC could be applied to advance the circular economy, according to López-Gamero et al. (2011), giving it a competitive edge over rivals.

The final hypothesis of direct relationship reveals that circular economy (CE) directly affects organizations' sustainable performance (SP). According to recent studies, CE can be a useful tactic for improving firms SP (Bag et al., 2022). Moreover, Jinru et al. (2021) show that a key component of businesses' CE is sustainable manufacturing. Sustainable manufacturing can create valuable products with a major positive impact on the environment by making the best use of resources such as energy, raw materials, and labour (Aboelmaged et al., 2018). Moreover, Khan et al. (2022) affirmed that CE has a significant role in improving SP by minimizing carbon emission, waste and enhancing energy efficiency.

6. Conclusion

This study develops a conceptual pathway demonstrating how corporate social responsibility (CSR) initiatives translate into sustainable performance through the sequential development of green intellectual capital (GIC) and the adoption of circular economy (CE) practices. The model highlights that CSR alone may not automatically yield sustainability outcomes unless organizations cultivate environmentally oriented knowledge, capabilities, and relationships. By investing in green human skills, supportive organizational systems, and environmentally focused stakeholder networks, firms build GIC that enables the effective implementation of circular strategies such as resource efficiency, recycling, reuse, and waste minimization.

The findings implied that GIC serves as a critical internal mechanism through which CSR commitments are operationalized, while the circular economy functions as the practical execution platform that converts green capabilities into measurable environmental, economic, and social gains. Consequently, sustainable performance emerges as the cumulative outcome of responsible governance, knowledge-based green resources, and regenerative business practices.

The model contributes to theory by integrating CSR, intellectual capital, and circular economy perspectives into a coherent sustainability pathway. From a managerial standpoint, it underscores the importance of moving beyond symbolic CSR toward capability development and systemic transformation of business processes. The study findings also recommend firms to invest in green knowledge systems and eco-innovation in order to develop GIC. It is also suggested that managers need to enhance cross-functional coordination (R&D, operations, marketing) to effectively

implement circular strategies. Policymakers may also benefit from encouraging initiatives that simultaneously promote corporate responsibility, green knowledge creation, and circular innovative ecosystems. The study recommends governmental bodies to design policies that support circular economy adoption, such as incentives for recycling, eco-design, and sustainable production.

Following are the future search direction of the current study: Firstly, future research can empirically test this framework across industries and national contexts, examine potential moderating variables such as organizational culture or regulatory pressure, and explore feedback effects between sustainable performance and continued CSR engagement. Secondly, future studies may adopt generative artificial intelligence Sattar et al. (2025), advanced analytical techniques, including machine learning Hamza (2024) or hybrid modeling approaches Hussain et al. (2025), to empirically test the nonlinear and interaction effects between CSR, green intellectual capital, and circular economy practices. Overall, the model provides a comprehensive lens for understanding how organizations can achieve long-term sustainability while maintaining competitiveness in an increasingly resource-constrained world.

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