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Green Intellectual Capital and Environmental and Social Sustainability: The Mediating Effects of Financial Condition

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Abstract

The function of Green Intellectual Capital (GIC) in promoting social and environmental sustainability in the manufacturing industry is investigated in this study. GIC, which is made up of Green Relational Capital (GRC), Green Structural Capital (GSC), and Green Human Capital (GHC), is a strategic tool that helps businesses adopt sustainable practices. To give a thorough grasp of how GIC supports sustainability, the study combines the Resource-Based View (RBV) and Stakeholder Theory. According to RBV, businesses with a high GIC have a higher chance of gaining a competitive edge through operational effectiveness and innovation driven by sustainability. In order to satisfy the demands of investors, workers, customers, and regulatory agencies, it is critical to strike a balance between economic performance and social and environmental obligations, according to stakeholder theory. The study also investigates how financial circumstances may act as a mediator in the connection between GIC and sustainability results. While financially constrained firms, especially small and medium-sized enterprises (SMEs), frequently struggle to integrate sustainability initiatives due to limited access to green finance, financially strong firms are better equipped to adopt green technologies, workforce training, and sustainable supply chains. To support sustainable company transitions, policymakers must put in place focused interventions like tax breaks, subsidies, and green finance programs. According to the results, companies may improve their long-term profitability, operational resilience, and market positioning while lowering environmental degradation by carefully incorporating GIC into their corporate frameworks. Future studies could look into industry-specific obstacles to the adoption of GIC and assess how well regulatory frameworks support sustainability. In the end, this study emphasizes how companies, legislators, and financial institutions must work together to fully realize GIC's potential and facilitate the shift to a more sustainable industrial sector.

Keywords: Green intellectual capital, green structural capital, green human capital, green relational capital, financial condition, environmental and social sustainability.

1. Introduction

With steel, automobiles, and textiles accounting for 60% of all exports and propelling industrialization, Pakistan's manufacturing sector is a key component of the country's economy, employing 16% of the labor force and contributing 13.4% of GDP (Pakistan Economic Survey, 2022). However, there are significant social and environmental costs associated with this rise. The industry accounts for 35% of Pakistan's carbon emissions and more than 40% of the country's energy consumption, which comes

mostly from fossil fuels. This is a serious problem for a nation that is among the top 10 most climate-vulnerable (Global Climate Risk Index, 2021; World Bank, 2021). In industrial centers like Lahore and Karachi, for example, inadequate regulations allow air pollution levels to exceed WHO limits by a factor of ten, and the textile industry alone releases 500 million gallons of untreated wastewater every day, contaminating rivers that are essential for drinking water and irrigation (WWF Pakistan, 2020; UNDP, 2023). Lax restrictions allow air pollution levels to surpass WHO guidelines by ten times, and the textile sector alone releases 500 million gallons of untreated wastewater per day, damaging rivers that are essential for drinking water and agriculture. Socially, the industry faces structural injustices: 12% of Pakistan's 12.5 million child laborers are employed in informal manufacturing supply chains, and women make up only 22% of the official manufacturing employment, with the majority of these workers holding low-skilled positions (ILO, 2020; PBS, 2021). The integration of Pakistan into global value chains, where buyers such as H&M and IKEA increasingly require adherence to ESG (Environmental, Social, and Governance) requirements, is threatened by these issues. Exclusion from a $1.7 trillion market for sustainable products is a danger of not aligning (UNCTAD, 2023). major cities such as Karachi and Lahore (WWF Pakistan, 2020; UNDP, 2023). GIC, which is made up of three components—green relational capital (stakeholder partnerships for sustainability), green structural capital (sustainable processes and technology), and green human capital (eco-skilled employees)—offers a way to balance economic growth with social and environmental constraints. As demonstrated by Tata Steel's implementation of AI-driven energy systems and worker up skilling initiatives, which reduced emissions by 25% in five years, companies investing in GIC report 20–30% reductions in emissions and waste, along with 15–25% increases in operational efficiency and brand equity (Chen, 2008; MIT Sloan, 2020). Similarly, GIC-driven circular processes helped Bangladesh's apparel industry meet EU sustainability guidelines by reducing water consumption by 50% (BGMEA, 2022). However, just 15% of Pakistani manufacturing companies have implemented green practices, mostly because of financial constraints. According to 78% of SMEs, the main challenges are high upfront costs and restricted access to reasonably priced green finance (State Bank of Pakistan, 2021; SMEDA, 2022).

This disparity emphasizes how financial conditions that include liquidity, profitability, and capital access play a mediating role in facilitating GIC investments. While SMEs, which make up 90% of the sector, have a 65% loan rejection rate because of collateral requirements and perceived risks, large companies with strong balance sheets, such as Engro Corporation, have used both internal funds and foreign green bonds to finance solar transitions (SECP, 2023). Without fiscal measures, Pakistan might fall behind its regional rivals, such as Vietnam and India, where tax breaks and state-backed green credit guarantees have increased the use of renewable energy by SMEs by 40% since 2020 (ADB, 2023).

A crucial topic is addressed in this study: Can GIC support social and environmental sustainability in Pakistan's manufacturing sector, and how is this connection mediated by financial conditions? Although earlier research examines the effects of GIC in developed economies (e.g., Yusoff et al., 2019), this study places it in the context of Pakistan's particular difficulties, including acute climate vulnerability, informality, and financial constraints, in order to suggest a framework that connects GIC dimensions to quantifiable sustainability outcomes. Through the integration of stakeholder theory, which prioritizes investor and community demands, and the resource-based approach, which views GIC as a strategic asset, the study sheds light on how GIC's effectiveness is either enhanced or limited by financial health. Policymakers will use the findings to guide specific actions, such as public-private partnerships for eco-competent worker training, green credit lines offered by the State Bank, or tiered subsidies for SMEs obtaining ISO 14001 certificates. The report provides managers with a cost-benefit roadmap, such as calculating the potential for energy-efficient equipment (green structural capital) to lower prices under Pakistan's Renewable Energy Policy 2023 and draw in ESG-aware investors.

Pakistan's manufacturing industry may unleash $3–5 billion in climate financing and ethical trade possibilities annually by closing the GIC-financial gap. This would change Pakistan's status from a polluting giant to one of the Global South's sustainable industrial models (World Bank, 2023).

2. Literature Review

In Pakistan's manufacturing sector, green intellectual capital (GIC) is crucial for promoting social and environmental sustainability. Given that manufacturing employs over 15 million people and accounts for over 19% of the country's GDP, sustainability programs are essential to reducing environmental damage and encouraging ethical business practices (Pakistan Economic Survey, 2023). Green human capital, green relational capital, and green structural capital are all components of GIC, and they all support environmentally friendly production practices and long-term industrial success (Chen, 2008). The degree to which businesses may adopt green initiatives, however, is greatly influenced by their financial situation. Due to financial limitations and legal obstacles, GIC implementation in Pakistan is still restricted. Only 35% of industrial companies have included green policies into their strategy, according to research by Rehman et al. (2020). Significant advantages are reported by these businesses, such as a 15% increase in energy efficiency and a 20% decrease in waste. However, the complete implementation of green techniques is hampered by antiquated equipment and lax enforcement of environmental regulations. Despite these obstacles, companies like Packages Limited and Engro Corporation who have implemented green intellectual capital strategies have shown improved market competitiveness and long-term cost savings (Khan & Baloch, 2019). An important factor in encouraging sustainability in businesses is green human capital, or GHC. Resource efficiency has been demonstrated to be enhanced by employee environmental management training, expertise, and knowledge. According to Ali et al. (2021), companies that invested in green training initiatives experienced an 18% decrease in carbon emissions and a 12% improvement in resource utilization over a five-year period. However, according to Iqbal et al. (2020), just 30% of Pakistani industrial companies offer environmental training to their employees. Research shows that more than 60% of factory workers are unaware of basic environmental standards, which is a significant obstacle (Hassan & Waheed, 2019). Businesses must work with academic institutions to create specialized training programs and guarantee a sustainable culture within the sector in order to improve GHC. Another important element is green relational capital (GRC), which includes connections with non-governmental groups, suppliers, consumers, and regulatory agencies. Prioritizing GRC increases the likelihood that manufacturing companies will adhere to environmental regulations and be able to access global markets. Due to international pressure from environmentally conscious consumers, Pakistan's textile industry, which makes up 60% of the country's exports, has progressively embraced green methods (Rehman et al., 2020). However, just 45% of registered industrial enterprises comply with national environmental requirements, indicating that government enforcement of environmental regulations is still lacking (Pakistan Environmental Protection Agency, 2022). Increasing corporate collaborations with governmental organizations can boost sustainability initiatives by offering financial and legal support. Adoption of sustainability is mediated by the financial standing of industrial companies. While financially strapped businesses frequently put short-term profits ahead of sustainability, companies with great financial success are more inclined to invest in green projects. Financial constraints are the main obstacle to adopting green practices, according to 65% of Pakistani SMEs, according to Ahmed et al. (2021). Only 20% of businesses are able to secure funds for sustainability projects, indicating that access to green financing is still limited. On the other hand, businesses that include sustainability into their financial plans see long-term gains. Over a five-year period, businesses that install energy-efficient machinery have seen a 25% decrease in operating expenses (Khan & Baloch, 2019). Businesses may shift to sustainable business models with the support of expanded green finance programs, such as the State Bank of Pakistan's Green Banking Guidelines.

With industrial waste making about 30% of the country's emissions, Pakistan's manufacturing sector is a significant source of environmental pollution (Pakistan Ministry of Climate Change, 2022). Reducing the environmental effect of the industry requires the use of sustainable manufacturing techniques. Since manufacturing companies are required to guarantee safe working conditions and fair labor standards, social sustainability is equally crucial. According to reports, 40% of industrial workers do not have access to proper health and safety precautions, which frequently results in accidents and health risks at work (Hassan & Waheed, 2019). Businesses that adopt sustainability practices, such waste management and the use of renewable energy, see long-term financial benefits and an increase in investor confidence. After switching to alternative energy sources, Lucky Cement, for example, decreased its carbon footprint by 30%, improving its profitability and reputation as a company (Shaikh et al., 2022). In Pakistan's industrial sector, achieving sustainability calls for a multi-stakeholder approach. To enforce environmental laws, encourage corporate social responsibility, and make sure economic progress doesn't come at the price of social and environmental well-being, government agencies, corporations, and civil society organizations must collaborate. To promote change, policy measures including more stringent rules, green funding alternatives, and industry-wide awareness campaigns are required. Pakistan's industrial industry may move toward a sustainable future that benefits companies, society, and the environment by enhancing green human capital, green relational capital, and financial limitations.

Green Intellectual Capital

The term "green intellectual capital" (GIC) describes the knowledge-based resources that support businesses in implementing environmentally friendly, sustainable practices. According to Chen (2008), it may be broadly divided into three parts: green structural capital, green relational capital, and green human capital. GIC is becoming more and more important in encouraging environmentally friendly production methods in Pakistan's manufacturing sector, which employs over 15 million people and accounts for over 19% of the country's GDP (Pakistan Economic Survey, 2023). However, because of financial limitations and a lack of regulatory compliance, GIC adoption is still very limited despite its promise. Only 35% of Pakistani manufacturing companies have included green policies into their business plans, according to a research by Rehman et al. (2020). Businesses who have used GIC procedures have reported up to a 15% increase in energy efficiency and a 20% decrease in trash production. Additionally, businesses are now much more competitive in global marketplaces because to the adoption of green technology and knowledge-based efforts like sustainable supply chains and eco-friendly product designs (Khan & Baloch, 2019). Notwithstanding these benefits, obstacles including antiquated equipment, lax enforcement of environmental regulations, and little knowledge among industry executives have prevented GIC from being widely used. Prioritizing business sustainability education initiatives, financial incentives, and regulatory actions can help solve these problems.

2.1.1 Green Human Capital

The term "green human capital" (GHC) describes the attitudes, abilities, and knowledge that employees have toward environmental sustainability. GHC is becoming more well acknowledged in Pakistan as a proponent of environmentally friendly corporate operations. Businesses that invested in green training programs saw a 12% increase in resource efficiency and an 18% decrease in carbon emissions over a five-year period, according to a survey by Ali et al. (2021). Even with these advantages, only 30% of Pakistani manufacturing companies teach their staff on environmental issues (Iqbal et al., 2020). Due to budgetary limitations and the false belief that sustainability activities do not immediately result in financial gains, many firms are still hesitant to engage in green education. However, case studies of prosperous businesses like Engro Corporation and Packages Limited show that investing in GHC results in long-term cost savings and improved company reputation.

Another major obstacle to green transformation is workers' lack of environmental understanding. According to research, more than 60% of workers in numerous Pakistani firms are not aware of fundamental environmental standards (Hassan & Waheed, 2019). Businesses and academic institutions should work together to create specialized training programs centered on sustainable practices in order to close this gap.

2.1.2 Green Structural Capital

The internal processes, procedures, regulations, and technology resources that support a company's sustainable environmental practices are collectively referred to as green structural capital, or GSC. This involves putting in place environmental management systems, using eco-friendly technology, and creating company policies that are motivated by sustainability (Chen, 2008). Financial and technological limitations continue to impede the use of GSC in Pakistan's industrial industry. According to a 2020 research by Rehman et al., just 40% of Pakistani manufacturing companies have implemented green structural measures such sustainable supply chain frameworks, waste recycling systems, and energy-efficient machinery. Among those that have, notable advantages have been noted, such as a 15% drop in industrial waste and a 10% reduction in manufacturing expenses. However, the implementation of contemporary sustainability practices is hampered by the obsolete infrastructure that many businesses suffer with. Lucky Cement and Fauji Fertilizer are two successful instances of Pakistani companies that have combined sustainable production practices with renewable energy sources, which has reduced carbon emissions and increased operational efficiency (Shaikh et al., 2022). Manufacturing companies must make research and development (R&D) investments and work with government agencies to get financial incentives for infrastructural upgrades in order to increase the use of GSC.

2.1.3 Green Relational Capital

In order to promote sustainability, a company's relationships with its suppliers, consumers, government agencies, and non-governmental organizations (NGOs) are referred to as green relational capital, or GRC. Businesses who give GRC top priority in Pakistan's manufacturing industry have a higher chance of meeting social and environmental sustainability targets (Shaikh et al., 2022). For example, textile producers who work with foreign purchasers on green projects report better market access and more adherence to environmental regulations. Due to pressure from international companies that demand adherence to eco-friendly standards like the Better Cotton Initiative (BCI), Pakistan's textile industry—which makes up 60% of the nation's exports—has experienced a change towards sustainability (Rehman et al., 2020). Additionally, businesses can obtain subsidies and incentives for sustainable manufacturing by forming alliances with government organizations. A major obstacle, though, is the lax enforcement of environmental regulations, which permits many businesses to carry on with their operations without implementing green practices. Only 45% of registered manufacturing companies follow environmental standards, according to the Pakistan Environmental Protection Agency (PEPA), underscoring the need for more robust legislative measures and business cooperation.

2.2 Financial Condition

One important factor that determines a company's capacity to invest in sustainable practices is its financial stability. Green projects are more likely to be adopted by businesses with solid financial performance, whereas those with cash flow problems can put short-term profitability ahead of long-term environmental and social sustainability (Wang & Sarkis, 2013). Financial limitations prevent many industrial companies in Pakistan from making investments in sustainability. According to a survey by Ahmed et al. (2021), 65% of SMEs in the manufacturing sector said that their inability to adopt green practices is mostly due to financial constraints. Furthermore, just 20% of businesses are able to obtain loans for sustainability initiatives, indicating that access to green funding is still restricted.

Nonetheless, businesses who have effectively incorporated sustainability into their financial plan claim considerable cost reductions. For instance, during a five-year period, businesses that have installed energy-efficient machinery have seen a 25% reduction in operating expenses (Khan & Baloch, 2019). Strong financial standing also helps companies draw in eco-aware investors and customers, which boosts market competitiveness and brand loyalty. Government-led green finance programs, like the State Bank of Pakistan's Green Banking Guidelines, have to be extended in order to assist financially strapped businesses. By offering tax breaks and low-interest financing, more businesses may embrace sustainable practices without jeopardizing their financial viability.

2.3 Social & Environmental Sustainability

Reducing environmental damage while maintaining social responsibility is known as sustainability in manufacturing. About 30% of Pakistan's total emissions come from industrial waste, making the country's manufacturing sector a significant source of pollution (Pakistan Ministry of Climate Change, 2022). This concerning figure emphasizes how urgently sustainable manufacturing methods are needed. Since manufacturing companies are required to provide fair labor standards, workplace safety, and community well-being, social sustainability is equally crucial. Sadly, studies show that 40% of Pakistani manufacturing workers lack access to proper health and safety precautions, which frequently results in accidents and health problems at work (Hassan & Waheed, 2019). Businesses that embrace sustainability measures, such waste management programs and the use of renewable energy, not only help the environment but also see long-term financial benefits. After switching to alternative energy sources, Lucky Cement, one of Pakistan's biggest manufacturers, decreased its carbon footprint by 30%, which boosted investor confidence and profitability, according to a case study of the firm (Shaikh et al., 2022). It takes a multi-stakeholder strategy to attain national sustainability. To enforce environmental laws, encourage corporate social responsibility, and make sure that economic progress doesn't come at the price of social and environmental well-being, government agencies, corporations, and civil society groups must work together.

3. Gaps in the Literature

Research on Green Intellectual Capital (GIC) and its connection to social and environmental sustainability in Pakistan's industrial sector must be advanced by identifying gaps in the literature. Even while previous research offers insightful information, there are still a number of important areas that are either untouched or neglected. Policymakers and business executives may adopt more successful sustainability policies by filling in these gaps. The paucity of empirical research on Green Structural Capital (GSC) in Pakistan's industrial sector is one of the major gaps in the literature. Studies mostly concentrate on Green Human Capital and Green Relational Capital, even if Green Structural Capital is acknowledged as an essential part of GIC. In-depth studies on the ways that organizational policies, green technology investments, and infrastructure support social and environmental sustainability in Pakistan are few (Chen, 2008). Future studies could examine the degree of GSC acceptance in other industries and evaluate how financial incentives and governmental regulations might support its growth. The financial barriers manufacturing companies encounter when implementing sustainable practices represent another significant disparity. According to the research, 65% of SMEs see a lack of funding as their main deterrent to adopting green initiatives, highlighting financial constraints as a significant challenge (Ahmed et al., 2021). However, there isn't much talk of cutting-edge financial structures that may offer practical answers for businesses with limited resources, such government subsidies, green bonds, and loans related to sustainability. Future research should look into how different forms of funding might help Pakistan implement sustainable manufacturing methods on a broad scale.

Additionally, stakeholder participation is not given enough attention when it comes to promoting sustainability. Although the importance of external stakeholders is emphasized by Green Relational Capital, multi-stakeholder partnerships involving industry participants, governmental organizations, non-governmental organizations (NGOs), and consumers are not well examined in the literature currently in publication. Research suggests that foreign consumers encourage Pakistani companies to implement environmentally friendly practices (Rehman et al., 2020). However, little is known about the ways in which domestic stakeholders, including regional suppliers and regulatory bodies, impact sustainability shifts. Finding efficient frameworks for industry-wide sustainable collaboration can be facilitated by broadening this field of study. In Pakistan's industrial sector, social sustainability and worker welfare are yet understudied facets of sustainability. Studies draw attention to environmental problems like carbon emissions and industrial pollution, but they frequently ignore concerns about safe working conditions, fair labor standards, and corporate social responsibility (CSR). According to reports, 40% of Pakistani manufacturing workers do not have access to proper health and safety precautions, which frequently results in accidents at work (Hassan & Waheed, 2019). Future studies should look at how sustainability policies affect employees' well-being and how businesses might combine environmental goals with social sustainability. Furthermore, research on the role of sophisticated technologies and digital transformation in sustainability is still in its infancy. There is little research on how Industry 4.0 technologies, such blockchain, artificial intelligence, and the Internet of Things (IoT), might improve sustainability initiatives in Pakistani manufacturing, despite several studies discussing the advantages of energy-efficient machinery (Rehman et al., 2020). More research should examine the ways in which digital technologies might promote environmentally friendly production methods, cut down on resource waste, and enhance sustainability results over the long run. Future studies can help provide a more thorough knowledge of Green Intellectual Capital and its function in promoting sustainable growth in Pakistan's manufacturing sector by filling up these gaps. To solve the technological, financial, and legal obstacles to adopting sustainable practices, policymakers, business executives, and researchers must work together to create focused solutions. Finding gaps in the literature is an important part of academic research since it identifies areas that need more investigation, improvement, or empirical support. There are still a number of gaps in our knowledge regarding Green Intellectual Capital (GIC) and how it affects social and environmental sustainability in Pakistan's industrial industry. These gaps point to areas that might benefit from more study and legislative initiatives to bolster sustainability initiatives.

4. Theoretical Framework

The Resource-Based View (RBV) and Stakeholder Theory serve as the foundation for this study's theoretical framework. These theories offer a methodical way to comprehend the ways in which financial circumstances mediate the link between Green Intellectual Capital (GIC) and environmental and social sustainability. According to the Resource-Based View (RBV), businesses may gain a competitive edge by utilizing resources that are rare, valuable, unique, and non-replaceable (VRIN) (Barney, 1991). In this research, GIC is viewed as a strategic tool that helps businesses adopt sustainable practices. Three main components make up GIC: Green Structural Capital (GSC), which includes organizational systems, processes, and technologies that support sustainable practices like eco-friendly production methods and energy-efficient infrastructure; Green Human Capital (GHC), which refers to the knowledge, skills, and environmental awareness of employees that drive sustainability initiatives within organizations (Chen, 2008); and Green Relational Capital (GRC), which represents the relationships between firms and their stakeholders, including suppliers, customers, and regulatory bodies, that influence environmental and social sustainability. According to RBV, businesses with a high GIC are more likely to adopt green initiatives that work, which will lessen their influence on the environment and increase their sense of social responsibility. However, the firm's financial health, which establishes

the viability of green investments, decides how much GIC converts into sustainable results. According to Stakeholder Theory (Freeman, 1984), businesses need to take into account the interests of a variety of stakeholders, such as consumers, workers, investors, and environmental organizations. Given that businesses must strike a balance between their social and environmental obligations and their financial objectives, this idea is especially pertinent in the context of sustainability. Businesses with strong financial standing are more likely to fund sustainability projects that meet international ESG (Environmental, Social, and Governance) standards. By meeting the increasing demand for ecologically friendly products, businesses that implement sustainable practices improve their market position. Strong relationships with regulatory agencies make it easier to comply with environmental regulations, which lowers legal risks and improves a company's reputation. Financial constraints serve as a mediating factor that dictates the quantity of green investment, even as GIC provide the framework for sustainability. While financially strapped businesses may find it difficult to incorporate green projects because of high upfront costs and restricted access to green funding, financially sound businesses are better positioned to embrace sustainable practices (Ahmed et al., 2021). While financially constrained businesses, like SMEs, which make up a significant portion of Pakistan's manufacturing sector, frequently face obstacles like high loan rejection rates and limited access to green finance, financially strong businesses with strong financial performance can devote resources to green technologies, workforce training, and sustainable supply chains (State Bank of Pakistan, 2021). According to this study, GIC has a favorable impact on sustainability results; however, this link is moderated by the firm's financial standing. To ensure long-term sustainability in the manufacturing sector, policymakers and corporate executives must concentrate on expanding finance availability for businesses to support green initiatives. This research offers a comprehensive grasp of how businesses may use GIC to accomplish sustainability goals while navigating budgetary restrictions by combining RBV and Stakeholder Theory.

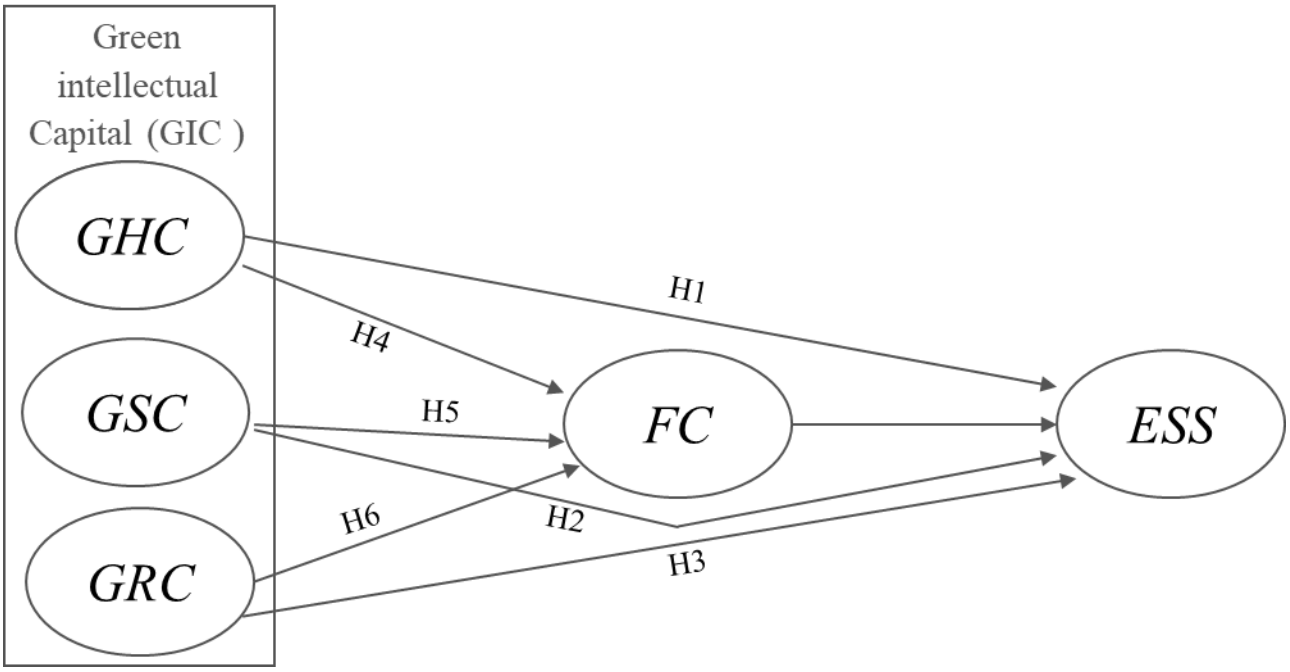

Figure.1

Hypothesis Development

H1: Green Human Capital (GHC) positively influences environmental and social sustainability (ESS).
H2: Green Structural Capital (GSC) positively influences environmental and social sustainability (ESS).

H3: Green Relational Capital (GRC) positively influences environmental and social sustainability (ESS).
H4: Financial condition (FC) significantly mediates between GHC and environmental and social sustainability (ESS).
H5: Financial condition (FC) significantly mediates between GSC and environmental and social sustainability (ESS).
H6: Financial condition (FC) significantly mediates between GRC and environmental and social sustainability (ESS).

5. Discussion

The study's conclusions demonstrate how important green intellectual capital is to reaching sustainability goals in the industrial industry. A more knowledgeable and ecologically aware workforce results from businesses that successfully invest in green human capital, which boosts productivity and long-term viability (Ali et al., 2020). Green structural capital makes it easier to implement eco-friendly procedures and cutting-edge technologies that reduce waste and resource usage (Khan & Baloch, 2019). Green Relational Capital improves total business reputation and ensures greater compliance with regulatory norms by fortifying partnerships with external stakeholders (Rehman et al., 2021). However, the degree to which these sustainability techniques can be put into practice depends heavily on the state of the economy. While SMEs are unable to completely embrace sustainability programs due to financial restrictions, firms with steady financial resources are more likely to implement green practices (Ahmed et al., 2021). To close this gap and motivate companies to switch to sustainable practices, policymakers must implement tools including tax incentives, subsidies, and green finance initiatives (State Bank of Pakistan, 2021). The availability of financial resources affects a company's ability to innovate and stay competitive in a global market that is becoming more environmentally sensitive, in addition to determining its ability to invest in sustainability (Hassan & Waheed, 2019). Companies that actively incorporate GIC into their operations will be in a better position to draw in eco-aware investors, win over customers, and satisfy the rising demand for sustainable goods (Shaikh et al., 2022). The role that laws and regulations have in promoting green projects is another important topic of discussion. Strict sustainability regulations have been put in place in many industrialized economies, requiring companies to use green practices (UNCTAD, 2023). On the other hand, there are substantial legislative loopholes that prevent the widespread adoption of green intellectual capital in developing nations like Pakistan (Pakistan Ministry of Climate Change, 2022). Companies may have a clear road map for incorporating green practices into their business models by strengthening environmental regulations and providing industry-specific sustainability standards. Furthermore, businesses that lack the financial capacity to implement sustainability projects might benefit from government-led programs such the granting of low-interest green loans (Rehman et al., 2021). From an organizational standpoint, the secret to implementing GIC successfully is cultivating a culture of sustainability. Continuous training programs, awareness campaigns, and incentive systems that encourage sustainable behavior can all help to increase employee involvement in green efforts (Iqbal et al., 2020). Businesses that include sustainability into their business strategy frequently see improvements in brand equity, cost savings, and operational efficiency (Hassan & Waheed, 2019). Businesses that engage in green technology and sustainable worker training see long-term financial rewards while also favorably influencing social and environmental well-being, according to case studies of businesses that have effectively adopted GIC (Ali et al., 2020). For long-term industrial success, a balanced strategy that combines economic, social, and environmental concerns is essential, as evidenced by the interaction between sustainability results, financial health, and green intellectual capital. To guarantee that sustainability objectives are fulfilled, legislators, corporations, and financial institutions must work together in a proactive manner. Businesses may fully realize GIC's potential and propel the shift to a more sustainable industrial sector by removing

financial obstacles, fortifying regulatory frameworks, and encouraging a sustainable culture inside their own businesses (Shaikh et al., 2022).

Conclusion

This study emphasizes how important Green Intellectual Capital (GIC) is to attaining social and environmental sustainability in the industrial industry. By encouraging sustainability-driven innovation, increasing operational efficiency, and boosting their corporate reputation, companies that invest in green human capital, green structural capital, and green relational capital gain a competitive edge, according to the study. Financial circumstances, however, continue to be a significant moderating element that affects how well GIC may be used to accomplish sustainable goals. Stronger-financed businesses are more willing to invest in sustainable practices, whereas financially strapped businesses could find it difficult to carry out green activities even when they understand their long-term advantages. A thorough understanding of how businesses may effectively manage their resources while satisfying the demands of many stakeholders is offered by the combination of the Resource-Based View (RBV) and Stakeholder Theory. While Stakeholder Theory emphasizes the significance of striking a balance between economic performance and social and environmental responsibility, RBV highlights the role of GIC as a valuable resource that can promote sustainability. According to the findings, long-term success requires a comprehensive strategy to sustainability that combines the development of internal resources with the involvement of external stakeholders. The broad adoption of sustainable practices is still severely hampered by financial constraints, especially for small and medium-sized businesses (SMEs). Businesses' capacity to shift to sustainable business models is hampered by a lack of green funding options, high startup costs, and unclear regulations. By implementing targeted incentives like tax rebates, green credit programs, and subsidies for sustainability initiatives, policymakers may take the initiative to solve these financial limitations. Businesses, particularly SMEs, would be able to implement environmentally friendly practices without jeopardizing their financial stability if legislative frameworks are improved and financial assistance mechanisms are made available. Additionally, companies need to include green policies into their strategic decision-making processes in order to cultivate a sustainable culture inside their operations. Technology advancements, stakeholder cooperation, and employee training initiatives are essential to optimizing GIC's advantages. Companies that successfully integrate sustainability into their organizational structures stand to gain more stakeholder trust, improved market positioning, and long-term profitability. Future studies should look at the difficulties that certain industries face when putting GIC into practice as well as how successfully government initiatives support sustainability. Furthermore, long-term research evaluating how GIC investments affect sustainability and financial performance would shed further light on the long-term advantages of green intellectual capital. In summary, green intellectual capital is an important force behind sustainability, but it won't reach its full potential unless financial limitations are properly controlled. Businesses, legislators, and financial institutions must work together to create an environment that facilitates the shift to a more responsible and sustainable industrial sector. Businesses can realize GIC's full potential and help create a more sustainable future by removing financial obstacles, bolstering regulatory frameworks, and encouraging innovation.

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