Green Intellectual Capital and Sustainability in Manufacturing Industries in Saudi Arabia

Nadia Abdelhamid Abdelmegeed Abdelwahed
Department of Management, College of Business, King Faisal University, PO Box 400, Al-Ahsa 31982, Saudi Arabia.
*Email: nabdelwahed@kfu.edu.sa **(Corresponding Author)***

Mohammed A. Al Doghan
Department of Management, College of Business, King Faisal University; PO Box 400, Al-Ahsa 31982, Saudi Arabia
Email: mdoghan@kfu.edu.sa

Bahadur Ali Soomro
Department of Economics, Abdul Haq Campus, Federal Urdu University of Arts, Science and Technology, Karachi 75300, Pakistan
Email: bahadur.ali@scholars.usindh.edu.pk

The objective of the present study was to promote Sustainability through green intellectual capital (GIC) and its dimensions. In addition, this study intends to examine the mediating effect of green culture (GC) between GIC dimensions and Sustainability. The research employed quantitative techniques and acquired cross-sectional data from Saudi Arabian employees of large manufacturing companies (LMCs). The study used a technique of convenience sampling to obtain responses from respondents. The final sample size for the investigation was 268 valid cases. Green human capital (GHC), green structural capital (GSC), and green relational capital (GRC) have a positive and statistically significant effect on green capital (GC), economic performance (EP), environmental performance (ENP), and social performance (SP), as determined by structural equation modeling (SEM). Additionally, the study demonstrates that GC has a positive and significant influence on EP and ENP but a negligible impact on SP. Concerning mediating effects, it has been determined that GC is an effective mediator in forming the association between GHC and EP, GSC, and ENP. Conversely, GC does not form a positive association between GRC and SP. The study's findings would aid policymakers and administrators in understanding the contribution of GIC to GC and Sustainability. The study would contribute to the management, environmental science, and sustainability literature based on empirical findings. The study contributes to developing a green environment by promoting green culture, which ultimately improves the Sustainability of businesses.

Key words: Green intellectual capital (GIC), Green culture (GC), Sustainability, Performance, Large manufacturing companies (LMCs).

1. INTRODUCTION

Investigating the effects of green intellectual capital (GIC) on Sustainability is necessary for light of rising global concerns regarding environmental challenges. The GIC develops eco-friendly, pro-environment, and conducive-to-organizational-culture activities. Adopting the green culture (GC) and sustainable development (Paill et al., 2014; Roscoe et al., 2019) demonstrates GIC's commitment to defending the environment and representing environmental care (Paill et al., 2014; Roscoe et al., 2019). GIC is a new concept for organizations and significantly impacts businesses' value formation process. Chen (2008) defines GIC as "the total stocks of all types of intangible assets, knowledge, capabilities, and relationships concerning environmental protection or green innovation at the individual and organizational levels within a company" (p.277).

According to Yong et al. (2022), GIC (GHC, GSC, and GRC) can foster the growth of Sustainability (EP, ENP, and SP). Similarly, ENP indicates an organization's capacity to reduce air emissions, hazardous materials, energy consumption, material practices, and adherence to environmental regulations (Laosirihongthong et al., 2013). The final dimension (SP) of Sustainability emphasizes an organization's capacity to increase social welfare and

benefit, employee safety, and community health risks (Paulraj, 2011).

The contribution of LMCs to the economic and environmental Sustainability of Saudi Arabia is substantial. In the literature, a direct association of GIC with EP, ENP, and SP is observed in different contexts (Malik et al., 2020; Yusliza et al., 2020; Benevene et al., 2021; Minoja and Romano, 2021); however, a lack of evidence is found with the claim of GIC and GC towards Sustainability specifically in Saudi Arabian LMCs in an integrated manner (Ullah et al., 2022) Contextually, LMCs are ignored because this sector faces numerous obstacles, such as an inhospitable business environment, a lack of financial support, inadequate government support, and environmental issues (Ahmad, 2012). Recognizing the importance of GIC and GC to Sustainability, we formulated the following research questions with the aid of the literature:

Q1: What is the role of GIC and GC in developing Sustainability among the Saudi Arabian employees of LMCs?

Q2: How GC develops the relationship between GIC and Sustainability among the Saudi Arabian employees of LMCs?

The study would provide policymakers with guidelines for

addressing environmental, organizational, and Sustainability concerns with the aid of GIC and fostering a conducive GC. In addition, the study will aid in comprehending the significance of GIC, GC, and Sustainability in fostering a healthy performance environment in which the economy can flourish and develop exponentially. The research would aid in resolving the problems that existed among employees in the workplace. Lastly, the findings would increase the depth of the literature by adding empirical confirmation from Saudi Arabian LMC employees.

2. LITERATURE REVIEW AND MODEL

Investigating the effects of GIC on organizational Sustainability is crucial in light of the rapidly worsening environmental issues (Yusoff et al., 2019). The performance has a high standing, has been the subject of much scholarly discussion, and was considerably predicted by internal green integration and supplier sustainability (Shah and Soomro, 2021). An analysis demonstrates a predictive and advantageous influence on innovation and organizational learning using the EP using structural equation modeling (SEM) (Soomro et al., 2020). With the help of green innovation (GI), GIC impacts the environment and the economy. The GHC, GRC, and GSC components of the GIC have an impact on a firm's performance, and the mediating role of GI helps to illuminate these correlations (Wang and Juo, 2021). Entrepreneurial orientation has a beneficial impact on strategic entrepreneurship and organizations' financial performance, according to Soomro and Shah (2020). Ullah et al. (2022) also note that GIC and GI considerably impact company sustainability. However, GSC has a moderating effect on the Sustainability of Pakistani commercial organizations. GI is linked to green employee involvement and green performance management (Shah and Soomro, 2022). In Malaysian manufacturing enterprises, GI has a relevant and significant association with company sustainability, according to Suki et al. (2022).

Similarly, Nisar et al.'s study from 2021 proposes green training and development as a crucial step in forming GIC. It encourages environmentally friendly behaviors in the hotel sector. Haldorai et al. (2022) claim that the green commitment of senior management and GIC directly impacts green HRM and hotel ENP. These further bolster the mediation's findings. GIC impacts ENP and environmental consciousness in developed situations. The connection between GIC and ENP is also mediated by environmental consciousness (Boso et al., 2022).

GI and green HRM are established through organizational environmental culture in Saudi Arabia's SMEs. Green HRM and GI are also important indicators of environmental Sustainability and EP. The linkages between organizational environmental culture, environmental Sustainability, and EP are positively shaped by GI and green HRM (Al Doghan et al., 2022). Sustainability and environmentalism provide substantial problems and issues for organizations. The investigation

by Malik et al. (2020) highlights the significant role that green HRM plays in creating environmental business strategies using cross-sectional data. The results also imply that GHC, GSC, and GSC are significant and proficient sustainability analysts for the company. The study also raises the possibility that environmental initiatives directly affect ENP while potentially mitigating the link between GI and ENP in large manufacturing businesses (Kranti K. Dugar, 2022). They provide a boost to growth and a path to Sustainability in SMEs. Additionally, in the Saudi Arabian city of Riyadh, the acquisition of green human resources is only marginally correlated with training, development, and a focus on green human resources (Faisal and Naushad, 2020). Alnaim et al. (2022) claim that GI is a key predictor of green inventiveness in Saudi Arabia.

Therefore, we assert some gaps based on the voluminous literature mentioned above. In contrast to the setting of Saudi Arabia, the literature first shows a direct link between GIC and EP, ENP, and SP in other contexts (Malik et al., 2020; Yusliza et al., 2020; Benevene et al., 2021; Minoja and Romano, 2021). Second, unlike GIC, EP, ENP, and SP are not also examined for the GC factor (Ullah et al., 2022; Suki et al., 2022). Third, prior investigations (Baharum and Pitt, 2009; Yadiati, 2019) did not identify GC as a mediator between GIC, EP, ENP, and SP. Despite their more significant contribution to Saudi Arabia's economic development (Varshney et al., 2013), LMC personnel still need more regard (Mellahi, 2006; Ahmad, 2012; Al-Dhabaan, 2021). We created Figure 1 to investigate the employees of LMCs in Saudi Arabia based on the aforementioned existing links and gaps in the literature.
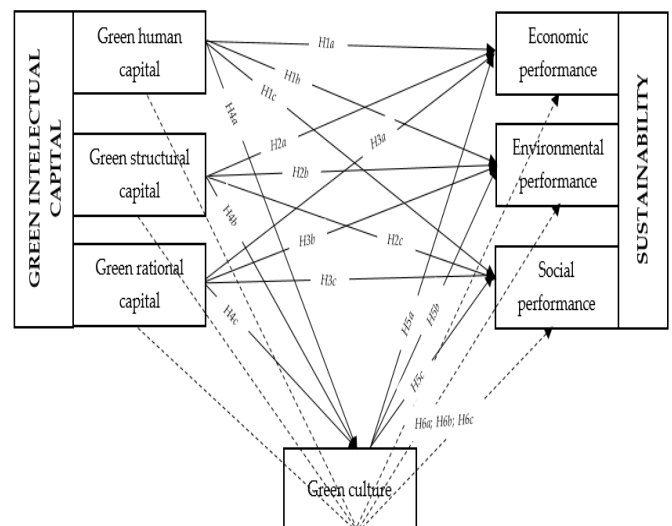
3. HYPOTHESES DEVELOPMENT
3.1 Green intellectual capital and Sustainability

There is a rising trend of increasing GIC in treating environmental problems (Yusoff et al., 2019). The GSC and GRC elements of GIC, i.e., the Sustainability of business sustainability, are essential. According to Malik

et al. (2020), GIC (GHC, GSC, and GRC) and green HRM practices, i.e., recruiting and selection and green rewards, impact a firm's Sustainability. Similarly, to this, the study by Benevene et al. (2021) shows that GIC was first introduced in 2008 and has since become a growth agent. It gives organizations a solid basis for fostering Sustainability. GIC plays a significant function in boosting sustainable performance in manufacturing companies. Additionally, it has a favorable impact on EP, ENP, and SP (Yusliza et al., 2020). Wang and Juo's (2021) empirical analysis investigate the impact of GIC on environmental performance with the aid of the mediation of green innovation among staff members of high-tech companies. The study's findings highlight the significance of the relationships between EP, green, and performance for GIC characteristics such as GHC, GSC, and GRC. Additionally, it is discovered that the green innovation factor acts as a mediator between EP, GSC, and green performance. Their intellectual capital improves the performance of Italian waste management companies. The complete range of governance and management advancements, including those that link intellectual capital, incorporate responsibility for Sustainability (Minoja and Romano, 2021).

Munawar et al. (2022) assessed respondents from various occupation levels, including top and middle management, entry-level management, and frontline employees from many hotel chains in Pakistan. The review points to the positive and active contribution of green HRM to green business innovation. Additionally, GHC and environmental knowledge both play a moderating role. The empirical findings of Fatima et al. (2019) show that aggregate energy use, renewable energy, and human capital all have bidirectional causal relationships with EP. Through green HRM, the GHC and organizational ENP favorably correlate. Besides GRC, two GIC dimensions in Iranian public firms, namely GHC and GSC, are favorably connected with EP and ENP (Asiaei et al., 2022). Nisar et al. (2021) claim that green training and development are the most effective strategies to increase managers' pro-environmental attitudes and intellectual capital. Shah et al. (2021) asserts that there is a substantial relationship between relational, green capital, and ENP based on data from hotels in Bahrain and the United Arab Emirates. Additionally, the study discovers a significant correlation between environmental responsibility and ENP. Green HRM practices are more prevalent in Palestine than in a company.

Similarly, green HRM and hotel ENP correlate directly with GIC and top management green commitment (Haldorai et al., 2022). Sheikh (2022) contends that GHC and GSC significantly impact social innovation, whereas GRC has little impact. Similarly, GRC and GHC have a favorable impact on green HRM. Economy, society, and environmental performance are significantly associated with green HRM. According to Yong et al. (2022), GRC improves Sustainability (EP, ENP, and SP).

Agyabeng-Mensah et al. (2021), on the other hand, do not discover a substantial impact of GHC on economic performance, SP, or green competitiveness among SME managers in Ghana. According to Yusoff et al. (2019), GHC is not supported by the stability and Sustainability of the company. Only when ENP measurement occurs as a mediating construct does the GRC impact ENP (Asiaei et al., 2022). As a result, aside from its confirmation in Saudi Arabia, the literature claimed that most studies showed a positive connection between GSC and EP, ENP, and SP. Hence:

H1a. GHC positively and significantly predicts EP.

H1b. GHC positively and significantly predicts ENP.

H1c. GHC positively and significantly predicts SP.

With the help of green innovation, the three components of GIC significantly impact green and EP. The GSC accurately forecasts EP, ENP, and SP performance (Wang and Juo, 2021; Asiaei et al., 2022). According to the social capital theory, integrating green suppliers significantly impacts social capital growth, which encourages EP and ENP. However, GHC and GRC forecast green performance, and only GHC analyses EP in Al Issa et al. (2022). Environmental corporate social responsibility considerably impacts the structural, relational, and human capital of green IT in Taiwan.

However, according to Asiaei et al. (2017), GSC does not forecast economic Sustainability or EP. According to Yusoff et al. (2019), GSC and GRC have a crucial role in predicting the viability of Malaysian SMEs. According to Asiaei et al. (2022), businesses interpret GIC into enhanced organizational performance in the form of EP and ENP using ENP assessment. The PLS-SEM research by Yadiati (2019) strongly suggests that GSC significantly contributed to the development of ENP, resulting in a unit intensification of ENP of multinational companies in Indonesia. The GSC is an administrative component of organizational support and the firms' environmental response in Spain's manufacturing companies (Amores-Salvadó et al., 2021). Based on the association, we recommend the following:

H2a. GSC positively and significantly predicts EP.

H2b. GSC positively and significantly predicts ENP.

H2c. GSC positively and significantly predicts SP.

The SIC dimensions received a lot of consideration and importance, and this focus has a natural effect on how well businesses execute. Additionally, GRC and GSC mediate the impact of green supplier integration on EP and ENP. Sheikh (2022) claims that social innovation affects GSC and GSC, while GRC is not proven to be a significant predictor of social innovation. In light of the connections and significance of GRC, we suggested the following:

H3a. GRC positively and significantly predicts EP.

H3b. GRC positively and significantly predicts ENP.

H3c. GRC positively and significantly predicts SP.

3.2 Green Intellectual Capital and Green Culture (GC)

Managers and businesses can use the GIC priority to improve operating effectiveness. It aids in formulating policy, strategy, and business GC for the benefit of stakeholders and citizens. The PLS-SEM analysis in large industrial companies in Malaysia highlights the favorable impact of GHC and GRC on green HRM. Yadiati (2019) asserts that organizational reputation and GIC in multinational enterprises in Indonesia have a positive and significant impact on the ENP. The growth of links between GHC, GSC, and GRC and the sustainable competitive advantage of agricultural corporations in China is noticed for applying natural resource-based theory. A mediating influence of green product and process innovation is observed (Pan et al., 2021). Baharum and Pitt's (2009) literature research show how vital facilitation management is to performance, intellectual capital, and green strategy. The relationship between competitive advantage and green innovation strategic orientation in the Vietnamese hotel business, according to Wang (2022), is positively mediated by GIC (GHC, GSC, and GRC). Although GSC was noted with a notable moderating influence on business sustainability, a significant effect of GIC on business sustainability is seen in Pakistani enterprises (Ullah et al., 2022). Green innovation and GIC are complementary to company sustainability, according to Suki et al. (2022). The GIC is, therefore, a crucial and reliable predictor of GC expectations in the Saudi context. Consequently, we advise the following:

H4a. GHC positively and significantly predicts GC.

H4b. GSC positively and significantly predicts GC.

H4c. GRC positively and significantly predicts GC.

3.3 Green Culture (GC) and Sustainability

Organizational GC predicts competitive advantage and green performance in industrial enterprises (Wang, 2019). According to Garca-Machado and Martnez-vila (2019), green innovation is mediating in establishing a connection between GC and ENP in the State of Mexico's automobile industry. According to Shah et al. (2021), ecological elements, including GC, a green psychological climate, and sustainable environmental efficiency, can predict green HRM. Ultimately, these results strengthen technical advancements and raise EP and Sustainability. Peer involvement, message credibility, leadership emphasis, and employee empowerment are the key GC enablers in Chinese manufacturing organizations. GC positively mediates the interaction between green HRM and ENP: Green HRM, green leadership behavior, and environmental sensitivity impact GC among private sector employees in Qatar. Additionally, there are strong connections between GC and employees' green behavior and ENP (Al-Swidi et al., 2021). We created: based on preexisting associations and the lack of proof in the Saudi context.

H5a. GC positively and significantly predicts EP.

H5b. GC positively and significantly predicts ENP.

H5c. GC positively and significantly predicts SP.

3.4 Green Culture (GC) as a Mediator

The GC is crucial for directly and indirectly fostering significant Sustainability, EP, and ENP within the organizations. According to Al-Swidi et al. (2002), GC mediates the relationship between green leadership behavior, green HRM, environmental concern, and employees' green behavior in Qatar. According to the ability-motivation-opportunity (AMO) hypothesis, green organizational citizenship behavior and green human resource management are favorably connected in Taiwan. Additionally, there is a strong correlation between the GC and green values (Hooi et al., 2022). According to Sudaryati et al. (2020), green process innovation mediates environmental culture and financial performance. Green core competence entirely and profoundly drives green innovation in Chinese tourism. Additionally, according to Qu et al. (2022), GC partially modifies the relationship between green innovation and green absorptive capacity.

Similarly, the empirical study by Muisyo et al. (2022) shows that civic organizational behavior toward the environment plays a significant and influential role in development. Developing green competencies, opportunities, and motivation helps the GC grow. Green HRM helps Malaysian manufacturing companies foster a culture of Sustainability and green innovation, showing how these concepts contribute to the organization's upgrading of ENP (Fang et al., 2022). Similarly, Shah et al.'s mediation analysis from 2021 reveals how green HRM affects GC and psychological climate. It illustrates how GC and a green psychological climate mediate environmental Sustainability. GC and green psychological climate significantly mediate the connection between green HRM, GHRMP, and sustainable environmental efficiency. According to an empirical study by Imran et al. (2021), green innovation and ENP fully mediate the link between GC and EP in Malaysian sectors. Job happiness, organizational dedication, and GC impact EP (Soomro and Shah, 2019). Considering the significance of GC as a mediator, we anticipate the following:

H6a. GC mediates the relationship between GHC and EP.

H6b. GC mediates the relationship between GSC and ENP.

H6c. GC mediates the relationship between GRC and SP.

4. METHODS

4.1 Survey Strategy and Tools

The study's primary goal is to evaluate Sustainability in terms of EP, ENP, and SP through GIC and to identify the GC's mediating role among Saudi Arabia's large manufacturing enterprises' (LMCs) workforce. Because it deals with statistics and produces results that are accurate and legitimate, the study uses a survey method based on a quantitative approach, which gives it more prominence in the management and social sciences (Soomro and Shah,

2020). Additionally, quantitative assessment is a good and practical method for conserving the researchers' scarce time and resources (Soomro and Shah, 2021). In addition, several researchers have used the same approach in the literature to investigate Sustainability through GIC, including Yusoff et al. (2019), Yusliza et al. (2020), Malik et al. (2020), Benevene et al. (2021), Wang and Juo (2021), and Asiaei et al. (2022).

We conducted pilot research using 18 samples to ensure the survey's validity and reliability before moving on to collect significant amounts of data. A survey questionnaire is used in the study to gather data. The scale's items were taken from Laosirihongthong et al. (2013) and Paulraj (2011), two works in the field of study. We received feedback from the study participants and university lecturers, who were fully aware of the research's quantitative techniques and digital platforms during the pilot study. As a result, we improved the instrument in response to some insightful feedback and launched it for extensive data collection.

4.2   Respondents are Sample Size

Saudi Arabia is a developing nation contributing significantly to the world's oil production. As a result, it signals that the efforts to address the environmental and climate concerns are not being taken seriously regarding GC, EP, ENP, and SP (Al-Gamrh & Al-dharma, 2019). We chose the LMC staff members because they face the formidable difficulties of Saudi Arabia's and the Gulf Arab countries' human capital development. Due to their extensive reliance on the petrochemical and oil industries, foreign labor, the low proportion of women in the workforce, and other factors, they confront several difficulties in their economic structure (Mellahi, 2006). Other than that, they deal with the main issues and limitations of LMCs are an unfriendly business climate, a lack of financial assistance, insufficient government backing, and environmental concerns (Ahmad, 2012).

Due to their more outstanding economic contribution than SMEs in Saudi Arabia, we obtained the data from LMCs there. The manufacturing industry has a positive and significant impact on the success of industrial growth and makes a healthy contribution to Saudi Arabia's economy. As a result of market globalization, Saudi Arabia's manufacturing sectors are working to increase their competitiveness to meet the more challenging demands of both domestic and foreign markets (Way et al., 2016). As Saudi Arabia is a high-income country with a significant emphasis on LMCs, we chose to target top trading manufacturing companies based on its stock exchange list (Al-Dhabaan, 2021). At first, we gave out 500 samples and got back 270 of them for a response rate of 54%. 268 usable samples are then applied for final analysis after data cleaning and filtering. The 268-person sample size is also sufficient for SEM analysis (Hair et al., 2020).

4.3   Data Collection Practice and Respondents' Ethics

We used the survey form to collect responses from the study's analytical units. We used both in-person visits and online surveys as methods of data gathering. Due to a standard and routine practice of behavioral model testing, the researchers visited the LMCS personnel and used a convenience sampling technique (Sumaedi et al., 2020). Surveys are a standard tool for gathering data for the study. Before getting the respondents' responses, we carefully explored their ethical principles while keeping them in mind. We first informed them of the study's purpose and goals and the opportunity for optional feedback. Therefore, the researchers ensured that a fictitious online study served as an example of their anonymity, confidentiality, privacy, and harm avoidance.

4.4   Measures

Three fundamental constructs—the GHC, GSC, and GRC—form the basis of the GIC. A sample item from the five that makeup GHC's evaluation is "The contribution of employees to environmental protection in our firm is better than that of our major competitors." Similarly, GRC is measured with five items as its tester item is "Our firm designs products and/or services in violation of the environmentalism desires of our customers," and GSC evaluated nine items with the sample item "Our firm is more innovative concerning environmental protection than are our major competitors." The study conducted by Chen (2008) served as the inspiration for all of the GIC dimensions' items. We used 10 Roscoe et al. (2019) items to analyze the GC factor. "It is simple to understand the company's green operations," reads the sample item on the scale. The sample item "Decrease in costs for materials purchasing" from Zhu et al. (2008) comprises five components that comprise the EP scale. Five items from Laosirihongthong et al. (2013) are used to evaluate ENP. "Improved compliance with environmental standards" is the test item. We adopted five items from Paulraj's (2011) study to quantify the SP, using the sample item "Improvement in community health and safety." A Likert scale with the options "strongly agree=1; agree=2; neutral=3; disagree=4 and strongly disagree=5" is used to score each question on the survey.

5.   ANALYSIS
5.1   Descriptive Statistics and Correlation Coefficient

To observe the demographic tendencies among the respondents, we used descriptive statistics, as is frequently done by social, business, and management academics (Fisher and Marshall, 2009). In this way, we observed a maximum mean score for GSC (3.794) and a lowest mean score for the ENP variable (3.337). Similar to how the GSC variable had the lowest (1.028) and highest (1.693) standard deviation values, the GC variable had both (Table 1). Additionally, we utilized the Pearson correlation coefficient test to gauge the potency or degree of linear relationships among all model-relevant variables. As a result, we noted the positive correlation between all of the constructs in Table 1 by adding one or two asterisks (* or **), confirming a high correlation level.

Table 1: Descriptive statistics and correlation matrix

S.No.	Constructs	M	SD	1	2	3	4	5	6	7
1	GHC	3.794	1.132	---						
2	GSC	3.673	1.028	0.388**	---					
3	GRC	3.382	1.567	0.466**	0.340**	---				
4	GC	3.590	1.693	0.412**	0.122*	0.472**	---			
5	EP	3.700	1.189	0.399**	0.338**	0.428**	0.388**	---		
6	ENP	3.337	1.201	0.359**	0.289**	0.392**	0.319**	0.382**	---	
7	SP	3.480	1.470	0.421**	0.192*	0.320**	0.214*	0.239*	0.421**	---

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Note(s): M= Mean; SD= Standard deviation; GHC= Green human capital; GSC=Green structural capital; GRC= Green relational capital; GC= Green culture; EP= Economic performance; ENP= Environmental performance; SP= Social performance

5.2 Measurement of Model Assessment

We used SEM because it has a high reputation and is worthwhile minimizing model error to obtain worthwhile outcomes and improved solutions for testing the validity with reliable and authentic statistical facts of the study (Hair et al., 2020). We determined how the measurement items were organized by observing the correlation between the measurement item and the construct level. We used the measurement model to check the association with parent factors to evaluate the items' relevance. First, given errant researchers like Hair et al. (2020), we emphasized the validity. The scores of loadings stayed in the range of 0.789 (gsc6) to 0.898 (enp1) and ensured acceptable values (> 0.70). In factor loadings, we saw that most items had outstanding consistency and correlations with their components (Hair et al., 2020). According to Hair et al. (2020), these values offer the current statistical significance and high convergence. However, four items—gsc5, gsc7, gc4, sp2, and gc7—did not receive the above-recommended scores (0.70) and were excluded. Additionally, we observed that the constructs had exceptional internal consistency (>0.70), as seen by the composite reliability (CR) ratings, which ranged from 0.791 (SP) to 0.862 (GHC) (Hair et al., 2020).

In addition, we discovered that the average extracted variance (AVE) ranged from 0.765(SP) to 0.870(GHC), which is higher than 0.50 and postulates a satisfactory convergence (Hair et al., 2020). Finally, it is noted that Cronbach's alpha for all constructs is adequate (> 0.70). It was maintained between 0.799 (ENP) and 0.865 (SP) (>0.70), approving adequate or high reliability for model confirmation (Table 2).

5.3 Structural Model Assessment

*We utilized analysis of moment structures (AMOS) IBM version 26.0 to assess the hypothesized paths. As presented in Table 3 and Figure 2, we examine the direct paths through critical ratio (CR) and found a significant positive effect of GHC on EP, ENP, and SP (H1a=CR=4.373***; H1b=CR=4.021***; H1c=6.777***; p< 0.01), which accepts the H1a, H1b, and H1c. Likewise, the effect of GSC on EP, ENP, and SP appeared positive and significant (H2a=CR=6.023***; H2b=CR=5.889***; H2c=4.722***; p< 0.01). These results approve the H2a, H2b, and H2c.*

Table 2. Measurement Model

Factors	Item code	Loading score	CR	AVE	(α)
Green human capital [GHC]	ghc1	0.877	0.862	0.870	0.860
	ghc2	0.856			
	ghc4	0.849			
	ghc3	0.832			
	ghc5	0.809			
Green structural capital [GSC]	gsc1	0.862	0.792	0.866	0.828
	gsc2	0.859			
	gsc3	0.844			
	gsc4	0.832			
	gsc9	0.820			
	gsc8	0.800			
	gsc6	0.789			
Green relational capital [GRC]	grc1	0.878	0.801	0.825	0.848
	grc2	0.856			
	grc3	0.832			
	grc4	0.829			
	grc5	0.810			
Green culture [GC]	gc1	0.872	0.844	0.788	0.858
	gc3	0.870			
	gc2	0.840			
	gc5	0.817			
	Gc10	0.810			
	Gc8	0.801			
	Gc9	0.799			
	Gc6	0.790			
Environmental performance [ENP]	enp1	0.898	0.828	0.809	0.799
	enp2	0.882			
	enp3	0.832			
	enp4	0.819			
	enp5	0.802			
Economic performance [EP]	ep1	0.852	0.819	0.811	0.847
	ep5	0.849			
	ep4	0.831			
	ep3	0.820			
	ep2	0.819			
Social performance [SP]	sp1	0.861	0.791	0.765	0.865
	sp3	0.843			
	sp4	0.820			
	sp5	0.801			

Note(s): CR= Composite reliability; AVE= Average variance extracted; α= Cronbach's alpha reliability

Regarding the same practice, the SEM analysis found a positive influence of GRC on EP, ENP, and SP (H3a=CR=6.000***; H3b=CR=4.321***; H3c=6.421***; p< 0.01). As a result, the data accept H3a, H3b, and H3c. Similarly, we noticed a positive predictive power of GHC, GSC, and GRC on GC (H4a=CR=4.672***; H4b=CR=6.319***; H4c=5.221***; p< 0.01), which supported the proposed hypotheses (H4a, H4b, and H4c). Moreover, the analysis showed a positive and significant effect of GC on EP and ENP (H5a=CR=6.091***; H5b=CR=4.821***; p< 0.01),

but non-significant on SP (H5c=CR=0.829; p> 0.01),). As a result, H5a and H5b are supported, and H5c is not accepted. Concerning to mediating effect, we noticed a positive and significant role of GC in shaping the association of GHC and GSC with EP and ENP (H6a=CR=3.231***; H6b=CR=3.992***; p< 0.01) (Table 3 and Figure 3), which accepted the H6a and H6b. On the other hand, GC is not found to be a positive and significant mediator between GRC and SP (H6c=CR=0.721; p> 0.01) (Table 3 and Figure 3). Consequently, H6a and H6b are supported, while the data do not accept H6c. For more understanding, we detailed the decision assessment in Table 4.

Table 3: SEM Estimations

S.No.	Relationships	Estimate	SE	CR	P-value
H1a	GHC → EP	0.242	0.392	4.373	***
H1b	GHC → ENP	0.210	0.321	4.021	***
H1c	GHC → SP	0.322	0.047	6.777	***
H2a	GSC → EP	0.371	0.044	6.023	***
H2b	GSC → ENP	0.309	0.041	5.889	***
H2c	GSC → SP	0.117	0.035	4.722	***
H3a	GRC → EP	0.362	0.040	6.000	***
H3b	GRC → ENP	0.202	0.333	4.321	***
H3c	GRC → SP	0.392	0.049	6.421	***
H4a	GHC → GC	0.291	0.039	4.672	***
H4b	GSC → GC	0.372	0.0414	6.319	***
H4c	GRC → GC	0.382	0.051	5.221	***
H5a	GC → EP	0.310	0.041	6.091	***
H5b	GC → ENP	0.119	0.039	4.821	***
H5c	GC → SP	0.036	0.033	0.829	0.462
H6a	GHC → GC → EP	0.109	0.033	3.231	***
H6b	GSC → GC → ENP	0.113	0.032	3.992	***
H6c	GRC → GC → SP	0.030	0.029	0.721	0.409

Note: CR=critical ratio; p***=significance level at <0.01.

Note(s): GHC= Green human capital; GSC=Green structural capital; GRC= Green relational capital; GC= Green culture; EP= Economic performance; ENP= Environmental performance; SP= Social performance

6. DISCUSSION AND CONCLUSION

The goal of the current study was to examine Sustainability both directly through GIC and indirectly through GC. Regarding the impact of GIC on Sustainability, the SEM findings indicated that GHC, GSC, GRC, and GC significantly influenced EP, ENP, and SP among Saudi Arabian LMC employees. These results are accorded with several scholars like Yusoff et al. (2019), Malik et al. (2020), Al-Swidi et al., 2021), Benevene et al. (2021), Al Issa et al. (2022), Asiaei et al. (2022); Sheikh (2022) and Suki et al. (2022) who underlined the significant positive effect of GIC on Sustainability in terms of EP, ENP, SP, and GC. These encouraging results demonstrate that employees in their companies substantially contribute to environmental conservation. They concentrate on attributes that benefit and support the environment and offer goods and services that are healthier and more environmentally friendly than those of their rivals. They collaborate to achieve their objectives while protecting the environment. For environmental protection, they spend a sizeable portion of their sales on R&D, and their staff is also involved in environmental management.
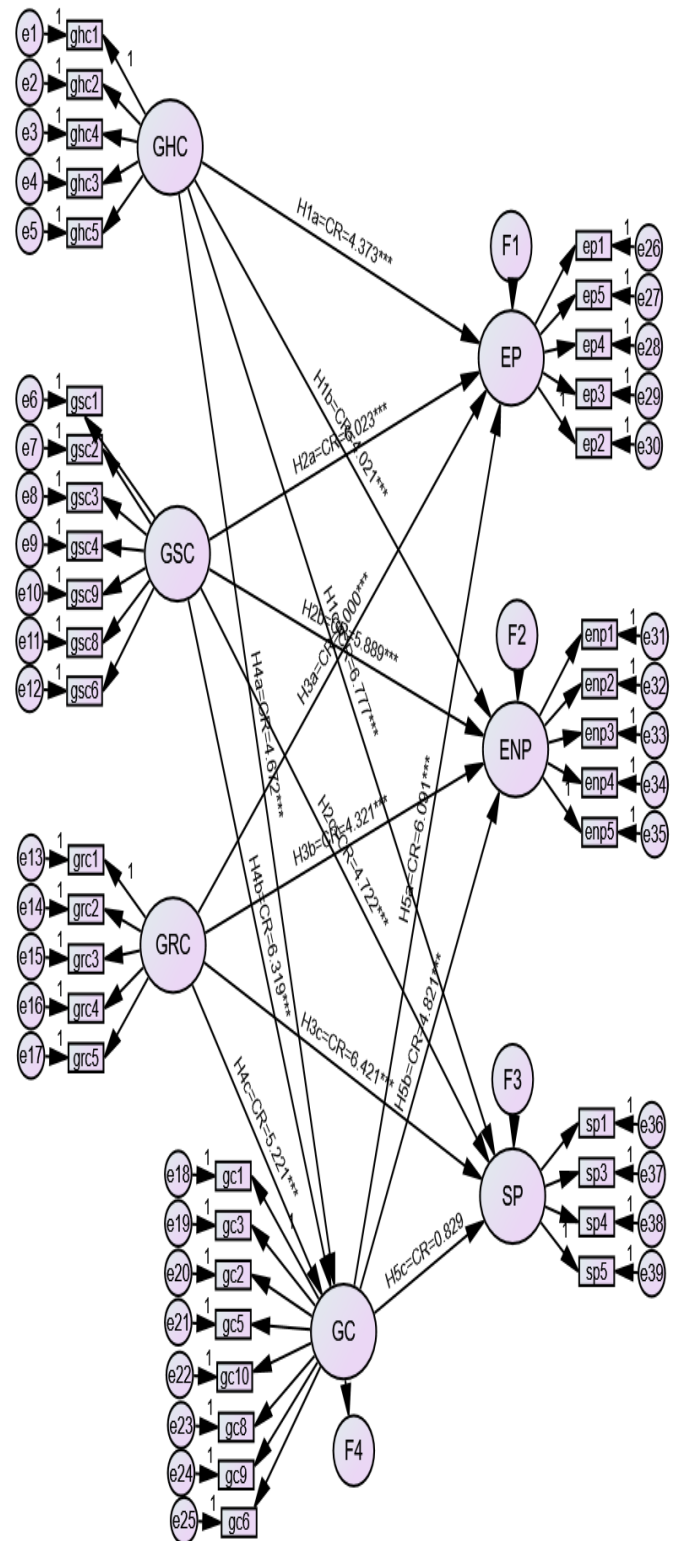

Figure 2: SEM analysis [direct effects]

Source: Conducted by authors

Note: CR=critical ratio; p***=significance level at <0.01.

GHC= Green human capital; GSC=Green structural capital; GRC= Green relational capital; GC= Green culture; EP= Economic performance; ENP= Environmental performance; SP= Social performance
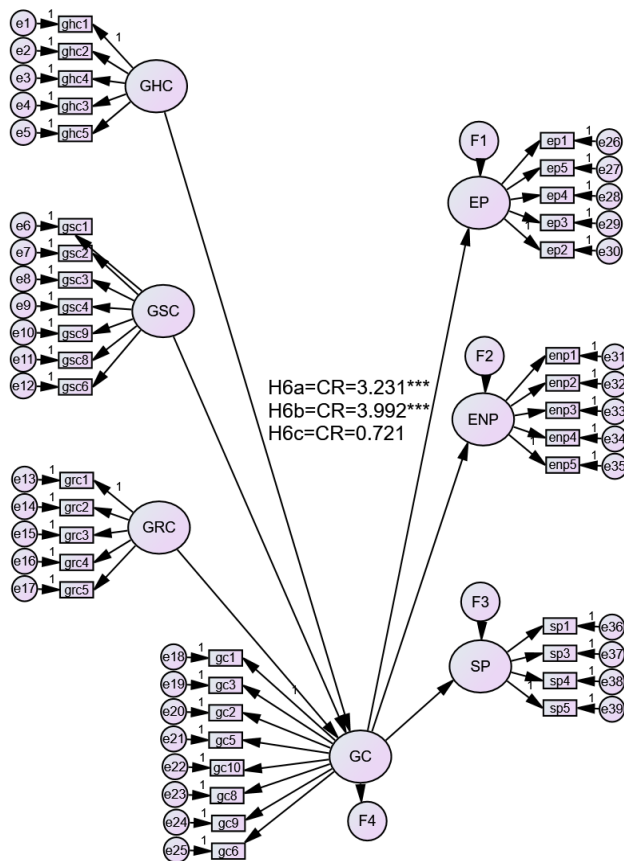
Figure 3. SEM analysis [indirect effects]

Source: Conducted by authors

Note: CR=critical ratio; p***=significance level at <0.01.

GHC= Green human capital; GSC=Green structural capital; GRC= Green relational capital; GC= Green culture; EP= Economic performance; ENP= Environmental performance; SP= Social performance

Table 4. Hypotheses Summary

S. No.	Hypotheses description	Decision
H1a	GHC positively and significantly predicts EP.	*Accepted*
H1b	GHC positively and significantly predicts ENP.	*Accepted*
H1c	GHC positively and significantly predicts SP.	*Accepted*
H2a	GSC positively and significantly predicts EP.	*Accepted*
H2b	GSC positively and significantly predicts ENP.	*Accepted*
H2c	GSC positively and significantly predicts SP.	*Accepted*
H3a	GRC positively and significantly predicts EP.	*Accepted*
H3b	GRC positively and significantly predicts ENP.	*Accepted*
H3c	GRC positively and significantly predicts SP.	*Accepted*
H4a	GHC positively and significantly predicts GC.	*Accepted*
H4b	GSC positively and significantly predicts GC.	*Accepted*
H4c	GRC positively and significantly predicts GC.	*Accepted*
H5a	GC positively and significantly predicts EP.	*Accepted*
H5b	GC positively and significantly predicts ENP.	*Accepted*
H5c	GC positively and significantly predicts SP.	*Rejected*
H6a	GC mediates the relationship between GHC and EP.	*Accepted*
H6b	GC mediates the relationship between GSC and ENP.	*Accepted*
H6c	GC mediates the relationship between GRC and SP.	*Rejected*

They intend to implement the overall significant developments for environmental protection smoothly. They think their companies' product and service plans align with their customers' environmental demands. Regarding environmental protection, they take into account client satisfaction. They expand their affiliation with environmental preservation in their business and have solid upstream suppliers. Their businesses are in charge of managing critical environmental protection partners. They are given green information and environmental policy standards along with green issues. Through their quest for green knowledge, they know the company's green operations and personally share green practices. They are inspired and encouraged to handle environmental challenges at work seriously. They have a lot of freedom to choose how they respond to environmental issues. Employees of MLCs work to reduce the expenses associated with acquiring materials, energy, waste treatment, and disposal, as well as the fines associated with environmental mishaps. In terms of the environment, they enhance adherence to environmental norms. They are prepared to cut back on energy use, hazardous material use, raw material use, and air pollutants. They work to raise the general stakeholder welfare and community health and safety level from a social perspective. They lessen risk and environmental repercussions for the general public and are willing to improve workplace health and safety for employees. Finally, they contribute significantly to the safety and improvement of community members' awareness of their fundamental rights.

The study's overall results revealed that GIC had a significant role in creating sustainable growth within Saudi Arabia's MLCs. It was determined that the GC component was substantial and that the enterprises' stability and the environment are protected due to their compliance with fundamental environmental regulations. Additionally, GC supports improving EP and ENP to strengthen the link between GIC and Sustainability. However, GC needs to contribute more to creating a direct connection with Sustainability and a subtly evolving linkage between GIC and Sustainability.

The study has some drawbacks because no theory was used to support the model. The study is only able to use cross-sectional data and a quantitative methodology. It is only open to LMC personnel who can easily access them. Finally, 268 samples were used to generate the study's conclusions.

In terms of its application, the study offers policymakers and environmental protection organizations ways to think about how GIC and GC might promote Sustainability without causing environmental harm. The uniqueness of the current inquiry reveals how GIC aids businesses in achieving a competitive edge and sustainable performance for future researchers. By utilizing this paradigm as a strategy, MLCs in emerging and established countries can increase their manufacturing capabilities for cleaner products. The study could support them in accomplishing

their objectives and foster collaboration to emphasize environmental preservation and firm stability with upstream supplements. The study would provide guidance for gathering green evidence from environmental policy to address green environmental concerns. Additionally, inspiring and urging workers to approach environmental issues in the LMCs with a great deal of responsibility would be beneficial. This aids in decision-making with significant autonomy about environmental issues. The work could theoretically pave the way for further development of theories by providing additional empirical support for GIC, GC, and Sustainability in a Middle Eastern nation. Researchers, decision-makers, managers, and practitioners interested in manufacturing enterprises' green and sustainable development may gain an understanding and persuasive theoretical orientation from the empirical conclusions. Finally, the study's findings will add to the knowledge of environmental science, climate change, and management, especially for Saudi Arabia's MLCs.

More longitudinal studies involving various organizations should be undertaken in the future. To give research a solid foundation, the upcoming investigation can concentrate on the induction of the relevant theory. Future research should also use probabilistic samples and diverse methodologies. Finally, aspects like environmental values, climate change, pro-environmental behavior, environmental safety, green HRM, green intents, etc., should be incorporated into future models.

Declaration of conflicting interests: The Authors declare no conflict of interest.

7. ACKNOWLEDGMENTS

REFERENCES

Agyabeng-Mensah, Y., & Tang, L. (2021). The relationship among green human capital, green logistics practices, green competitiveness, social performance and financial performance. *Journal of Manufacturing Technology Management*, *32*(7), 1377-1398. doi: https://doi.org/10.1108/JMTM-11-2020-0441

Ahmad, Z. S. (2012). Micro, small and medium-sized enterprises development in the Kingdom of Saudi Arabia: Problems and constraints. *World Journal of Entrepreneurship, Management and Sustainable Development*, *8*(4), 217-232. doi: https://doi.org/10.1108/20425961211276606

Al Issa, H.E., Abdullatif, T.N., Ntayi, J., & Abdelsalam, M.K. (2022). Green intellectual capital for sustainable healthcare: evidence from Iraq. *Journal of Intellectual Capital.* doi: https://doi.org/10.1108/JIC-02-2022-0046

Al-Dhabaan, F. A. (2021). Isolation and identification of crude oil-degrading yeast strains from Khafji oil field, Saud Arabia. *Saudi Journal of Biological Sciences, 28*(10), 5786-5792. doi: https://doi.org/10.1016/j.sjbs.2021.06.030

Al-Gamrh, B., & Al-dhamari, R. (2019). Firm characteristics and corporate social responsibility disclosure in Saudi Arabia (2014). *Working Paper - International Business Management,* 15. doi: https://dx.doi.org/10.2139/ssrn.2907396

Al-Swidi, A. K., Gelaidan, H. M., & Saleh, R. M. (2021). The joint impact of green human resource management, leadership and organizational culture on employees' green behaviour and organisational environmental performance. *Journal of Cleaner Production, 316*, 128112. doi: https://doi.org/10.1016/j.jclepro.2021.128112

Amores-Salvadó, J., Cruz-González, J., Delgado-Verde, M., & González-Masip, J. (2021). Green technological distance and environmental strategies: the moderating role of green structural capital. *Journal of Intellectual Capital, 22*(5), 938-963. doi: https://doi.org/10.1108/JIC-06-2020-0217

Asiaei, K., Bontis, N., Alizadeh, R., & Yaghoubi, M. (2022). Green intellectual capital and environmental management accounting: Natural resource orchestration in favor of environmental performance. *Business Strategy and the Environment, 31*(1), 76-93. doi: https://doi.org/10.1002/bse.2875

Asiaei, K., Jusoh, R., Barani, O., & Asiaei, A. (2022). How does green intellectual capital boost performance? The mediating role of environmental performance measurement systems. *Business Strategy and the Environment, 31*(4), 1587-1606. doi: https://doi.org/10.1002/bse.2971

Baharum, M.R., & Pitt, M. (2009). Determining a conceptual framework for green FM intellectual capital. *Journal of Facilities Management, 7*(4), 267-282. doi: https://doi.org/10.1108/14725960910990026

Benevene, P., Buonomo, I., Kong, E., Pansini, M., & Farnese, M. L. (2021). Management of green intellectual capital: Evidence-based literature review and future directions. *Sustainability, 13*(15), 8349. https://doi.org/10.3390/su13158349

Boso, R.K., Adusei, E., & Demah, E. (2022). How does green intellectual capital affect environmental performance? Evidence from manufacturing firms in Ghana". *Social Responsibility Journal.* doi: https://doi.org/10.1108/SRJ-12-2021-0503

Chen, Y.S. (2008). The positive effect of green intellectual capital on competitive advantages of firms. *Journal of Business Ethics, 77*(3), 271-28. doi: https://doi.org/10.1007/s10551-006-9349-1

Faisal, S., & Naushad, M. (2020). An overview of green HRM practices among SMEs in Saudi Arabia. *Entrepreneurship and Sustainability*

Issues, 8(2), 1228. doi: http://doi.org/10.9770/jesi.2020.8.2(73)

Fang, L., Shi, S., Gao, J., & Li, X. (2022). The mediating role of green innovation and green culture in the relationship between green human resource management and environmental performance. *Plos one, 17*(9), e0274820. doi: https://doi.org/10.1371/journal.pone.0274820

Fatima, N., Li, Y., Ahmad, M., Jabeen, G., & Li, X. (2019). Analyzing long-term empirical interactions between renewable energy generation, energy use, human capital, and economic performance in Pakistan. *Energy, Sustainability and Society, 9*(1), 1-14. doi: https://doi.org/10.1186/s13705-019-0228-x

García-Machado, J. J., & Martínez-Ávila, M. (2019). Environmental performance and green culture: The mediating effect of green innovation. An application to the automotive industry. *Sustainability, 11*(18), 4874. doi: https://doi.org/10.3390/su11184874

Hair Jr, J. F., Howard, M. C., & Nitzl, C. (2020). Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *Journal of Business Research, 109*, 101-110. doi: https://doi.org/10.1016/j.jbusres.2019.11.069

Haldorai, K., Kim, W. G., & Garcia, R. F. (2022). Top management green commitment and green intellectual capital as enablers of hotel environmental performance: The mediating role of green human resource management. *Tourism Management, 88*, 104431. doi: https://doi.org/10.1016/j.tourman.2021.104431

Hooi, L.W., Liu, M.S., & Lin, J.J.J. (2022). Green human resource management and green organizational citizenship behavior: do green culture and green values matter? *International Journal of Manpower, 43*(3), 763-785. doi: https://doi.org/10.1108/IJM-05-2020-0247

Imran, M., Arshad, I., & Ismail, F. (2021). Green organizational culture and organizational performance: The mediating role of green innovation and environmental performance. *Jurnal Pendidikan IPA Indonesia, 10*(4), 515-530. Retrieved from http://journal.unnes.ac.id/index.php/jpii

Jirakraisiri, J., Badir, Y.F., & Frank, B. (2021). Translating green strategic intent into green process innovation performance: the role of green intellectual capital. *Journal of Intellectual Capital, 22*(7), 43-67. doi: https://doi.org/10.1108/JIC-08-2020-0277

Kranti K. Dugar, J. F. (2022). Stigma Around the Consumption of Sanitary Napkins and Implications for International Marketing Strategy: A Case Study from Rural India. *International Journal of Instructional Cases, 6.* Retrieved from http://www.ijicases.com/search/vimukt_case/

Laosirihongthong, T., Adebanjo, D., & Tan, K.C. (2013). Green supply chain management practices and performance. *Industrial Management and Data Systems, 113*(8), 1088-1109. doi: https://doi.org/10.1108/IMDS-04-2013-0164

Malik, S. Y., Cao, Y., Mughal, Y. H., Kundi, G. M., Mughal, M. H., & Ramayah, T. (2020). Pathways towards Sustainability in organizations: Empirical evidence on the role of green human resource management practices and green intellectual capital. *Sustainability, 12*(8), 1-24. doi: https://doi.org/10.3390/su12083228

Mellahi, K. (2006). Human resource management in Saudi Arabia. In Managing Human Resources in the Middle-East, 115-138. Routledge. Retrieved from https://www.taylorfrancis.com/chapters/edit/10.4324/9780203485828-13

Minoja, M., & Romano, G. (2021). Managing intellectual capital for Sustainability: Evidence from a Re-municipalized, publicly owned waste management firm. *Journal of Cleaner Production, 279*, 123213. doi: https://doi.org/10.1016/j.jclepro.2020.123213

Muisyo, P.K., Qin, S., Ho, T.H., Julius, M.M., & Andriamandresy, B.T. (2022). Implications of GHRM on organisational citizenship behaviour: the mediating role of enablers of green culture. *International Journal of Manpower, 43*(3), 719-741. doi: https://doi.org/10.1108/IJM-05-2020-0245

Munawar, S., Yousaf, H. Q., Ahmed, M., & Rehman, S. (2022). Effects of green human resource management on green innovation through green human capital, environmental knowledge, and managerial environmental concern. *Journal of Hospitality and Tourism Management, 52*, 141-150. doi: https://doi.org/10.1016/j.jhtm.2022.06.009

Nisar, Q. A., Haider, S., Ali, F., Jamshed, S., Ryu, K., & Gill, S. S. (2021). Green human resource management practices and environmental performance in Malaysian green hotels: The role of green intellectual capital and pro-environmental behavior. *Journal of Cleaner Production, 311*, 127504. doi: https://doi.org/10.1016/j.jclepro.2021.127504

Paille, P., Chen, Y., Boiral, O., & Jin, J.F. (2014). The impact of human resource management on environmental performance: an employee-level study. *Journal of Business Ethics, 121*(3), 451-466. doi: https://doi.org/10.1007/s10551-013-1732-0

Paulraj, A. (2011). Understanding the relationships between internal resources and capabilities, sustainable supply management and organizational Sustainability. *Journal of Supply Chain Management, 47*(1), 19-37. doi: https://doi.org/10.1111/j.1745-493X.2010.03212.x

Qu, X., Khan, A., Yahya, S., Zafar, A. U., & Shahzad, M. (2022). Green core competencies to prompt green absorptive capacity and bolster green innovation: the moderating role of organization's green culture. *Journal of Environmental Planning and Management, 65*(3), 536-561. doi: https://doi.org/10.1080/09640568.2021.1891029

Roscoe, S., Subramanian, N., Jabbour, C. J., & Chong, T. (2019). Green human resource management and the enablers of green organisational culture: Enhancing a firm's environmental performance for sustainable development. *Business Strategy and the Environment, 28*(5), 737-749. doi: https://doi.org/10.1002/bse.2277

Shah, N., & Soomro, B. A. (2021). Internal green integration and environmental performance: The predictive power of proactive environmental strategy, greening the supplier, and environmental collaboration with the supplier. *Business Strategy and the Environment, 30*(2), 1333-1344. doi: https://doi.org/10.1002/bse.2687

Shah, N., & Soomro, B. A. (2023). Effects of green human resource management practices on green innovation and behavior. *Management Decision, 61*(1), 290-312. doi: https://doi.org/10.1108/MD-07-2021-0869

Shah, S. M. A., Jiang, Y., Wu, H., Ahmed, Z., Ullah, I., & Adebayo, T. S. (2021). Linking green human resource practices and environmental economics performance: the role of green economic organizational culture and green psychological climate. *International Journal of Environmental Research and Public Health, 18*(20), 10953. doi: https://doi.org/10.3390/ijerph182010953

Shah, S. M. M., Ahmed, U., Ismail, A. I., & Mozammel, S. (2021). Going intellectually green: Exploring the nexus between green intellectual capital, environmental responsibility, and environmental concern towards environmental performance. *Sustainability, 13*(11), 6257. doi: https://doi.org/10.3390/su13116257

Sheikh, A.M. (2022). Green intellectual capital and social innovation: the nexus. *Journal of Intellectual Capital, 23*(6), 1199-1220. doi: https://doi.org/10.1108/JIC-11-2020-0361

Soomro, B. A., & Shah, N. (2020). Entrepreneurial orientation and performance in a developing country: Strategic entrepreneurship as a mediator. *Business Strategy & Development, 3*(4), 567-577. doi: https://doi.org/10.1002/bsd2.122

Soomro, B. A., Mangi, S., & Shah, N. (2020). Strategic factors and significance of organizational innovation and organizational learning in organizational performance. *European Journal of Innovation Management. 24*(2), 481-506. doi: https://doi.org/10.1108/EJIM-05-2019-0114

Soomro, B.A., & Shah, N. (2019). Determining the impact of entrepreneurial orientation and organizational culture on job satisfaction, organizational commitment, and employee's performance. *South Asian Journal of Business Studies, 8*(3), 266-282. doi: https://doi.org/10.1108/SAJBS-12-2018-0142

Sudaryati, E., Agustia, D., Tjaraka, H., & Rizki, A. (2020). The mediating role of green innovation on the effect of environment-based culture on company performance. *International Journal of Innovation, Creativity and Change, 11*(11), 320-334. Retrieved from https://www.ijicc.net/index.php/ijicc-editions/2020/164-vol-11-iss-11

Suki, N. M., Suki, N. M., Sharif, A., Afshan, S., & Rexhepi, G. (2022). Importance of green innovation for business sustainability: Identifying the key role of green intellectual capital and green SCM. *Business Strategy and the Environment*. doi: https://doi.org/10.1002/bse.3204

Sumaedi, S., Bakti, I.G.M.Y., Rakhmawati, T., Astrini, N.J., Widianti, T., Damayanti, S., Massijaya, M.A., & Jati, R.K. (2020). A model of intention to use official COVID-19 websites. *Health Education, 120*(4), 249-261. doi: https://doi.org/10.1108/HE-07-2020-0048

Ullah, H., Wang, Z., Mohsin, M., Jiang, W., & Abbas, H. (2022). Multidimensional perspective of green financial innovation between green intellectual capital on sustainable business: the case of Pakistan. *Environmental Science and Pollution Research, 29*(4), 5552-5568. doi: https://doi.org/10.1007/s11356-021-15919-7

Varshney, D., Maqbool, S. S., & Bokhari, A. A. H. (2013). The role of HR in sustainable environmental development in Saudi Arabian Companies: An exploratory study. *ZENITH International Journal of Multidisciplinary Research, 3*(3), 276-287. Retrieved from https://www.indianjournals.com/ijor.aspx?target=ijor:zijmr&volume=3&issue=3&article=024

Wang, C. H., & Juo, W. J. (2021). An environmental policy of green intellectual capital: Green innovation strategy for performance sustainability. *Business Strategy and the Environment, 30*(7), 3241-3254. doi: https://doi.org/10.1002/bse.2800

Wang, C.H. (2019). How organizational green culture influences green performance and competitive advantage: The mediating role of green innovation. *Journal of Manufacturing Technology Management, 30*(4), 666-683. doi: https://doi.org/10.1108/JMTM-09-2018-0314

Wang, J. (2022). Building competitive advantage for hospitality companies: The roles of green innovation strategic orientation and green intellectual capital. *International Journal of Hospitality Management, 102*, 103161. doi: https://doi.org/10.1016/j.ijhm.2022.103161

Way, Y., Aichouni, M., Badawi, I., & Boujelbene, M. (2016). A survey on the implementation of total

quality management (TQM) at manufacturing industries in north region, Kingdom of Saudi Arabia. In 2016 2nd International Conference on Information Management (ICIM), 84-88. IEEE. doi: https://doi.org/10.1109/INFOMAN.2016.7477538

Yadiati, W. (2019). The role of green intellectual capital and organizational reputation in influencing environmental performance. *International Journal of Energy Economics and Policy, 9*(3), 261-268. doi: https://doi:10.32479/ijeep.7752

Yong, J.Y., Yusliza, M.Y., Ramayah, T., Farooq, K., & Tanveer, M.I. (2022). Accentuating the interconnection between green intellectual capital, green human resource management and Sustainability. *Benchmarking: An International Journal*. doi: https://doi.org/10.1108/BIJ-11-2021-0641

Yusliza, M. Y., Yong, J. Y., Tanveer, M. I., Ramayah, T., Faezah, J. N., & Muhammad, Z. (2020). A structural model of the impact of green intellectual capital on sustainable performance. *Journal of Cleaner Production, 249*, 119334. doi: https://doi.org/10.1016/j.jclepro.2019.119334

Yusoff, Y. M., Omar, M. K., Zaman, M. D. K., & Samad, S. (2019). Do all elements of green intellectual capital contribute toward business sustainability? Evidence from the Malaysian context using the Partial Least Squares method. *Journal of Cleaner Production, 234*, 626-637. doi: https://doi.org/10.1016/j.jclepro.2019.06.153

Zhu, Q., Sarkis, J., & Lai, K.H. (2008). Confirmation of a measurement model for green supply chain management practices implementation. *International Journal of Production Economics, 111*(2), 261-273. doi: https://doi.org/10.1016/j.ijpe.2006.11.029