AN EMPIRICAL INVESTIGATION OF THE RELATIONSHIP BETWEEN GREEN INTELLECTUAL CAPITAL AND CORPORATE SUSTAINABLE DEVELOPMENT

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Abstract

Increasing concern for environmental issues makes it important to investigate the relationship between green intellectual capital (GIC) and organisational sustainability (Yussof et al., 2019). GIC is considered a viable solution to sustainability issues (Jermsittiparsert, 2021). This study aims to examine the relationship between GIC, green human capital (GHC), green relational capital (GRC), green structural capital (GSC), with each dimension of corporate sustainable development (CSD) — social development (SD), economic development (ED), environmental development (EnD). This study used a sample of 168 medium-sized companies in Bali Province, Indonesia, and collected data using a direct questionnaire sent to the chief executive officers (CEOs). Data analysis employed partial least squares structural equation modeling (SEM-PLS) with WarpsPLS 8.0 software. The findings revealed a significant positive relationship between GHC and GSC with each CSD dimension. The study also showed that GRC only had a significant positive relationship with ED, while SD and EnD were found to be positively insignificant. An important contribution of this study is to provide a new conception of the role of GIC in building a sustainable company and can increase understanding of the important role of GIC and stimulate managers' interest in developing GIC to achieve sustainable results through the strategic management of GIC.

Keywords: Green Human Capital, Green Relational Capital, Green Structural Capital, Social Dimension, Economic Dimension, Environment Dimension

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1. INTRODUCTION

The emergence of environmental awareness among customers and stakeholders has major implications for organizations to move towards a green approach and adopt the concept of corporate sustainability. In a rapidly changing business environment, sustainable companies succeed in the market, because they are able to use their best resources and develop competencies to meet the challenges of existing constraints. Companies must be able to balance social, economic, and environmental goals. This is the core of corporate sustainable development (CSD).

CSD is a strategy that integrates economic goals with environmental and social aspects, weighing each other down and thus, ensuring long-term business success (Orth et al., 2020). CSD demonstrates the extent to which companies, in their operations, adopt social, economic, and environmental development (Chow & Chen, 2012). Social development (SD) is related to eradicating hunger and poverty; focuses on health protection, safety, and educational development. Economic development (ED) refers to the use of technical and technological solutions to meet material requirements that, at the same time, pose a minimum threat to the environment. Environmental development (EnD) is related to eliminating environmental degradation and environmental threats.

In a knowledge-based economy, the transition to innovative, competitive, and sustainable development is marked by the presence of intellectual capital (IC) (Mohamed et al., 2009). IC is one of the new approaches that can be used to solve environmental problems (Omar et al., 2017). The integration of tangible and intangible assets — especially green intellectual capital (GIC) — plays an important role in managing environmental issues and maintaining sustainability through the transfer of knowledge, best practices, technology, and other initiatives.

GIC encompasses all intangible resources, knowledge, capabilities, and relationships related to green protection or innovation, at both the individual and organisational levels within a company, including green human capital (GHC), green relational capital (GRC), and green structural capital (GSC) (Chang & Chen, 2012). GIC allows companies to actively seek new, innovative solutions to minimise the negative impact of company activities on the environment and, at the same time, improve the health of those living in the surrounding environment while generating profits. This is necessary for sustainability (Jardon & Martínez-Cobas, 2019) in supporting economic development and welfare and is in line with the 2030 Sustainable Development Goals (SDGs) agenda set by the United Nations.

Although IC issues have been widely discussed in recent years, the relationship of each component of GIC to the dimensions of CSD has not yet been empirically explored. In addition, even though GIC is a reasonable solution for CSD (Omar et al., 2017), it is still not widely known by academics and practitioners. This study intends to bridge this gap, at least to some extent. This research was conducted on small and medium enterprises (SMEs), especially medium-sized companies in the manufacturing sector in Indonesia. This is because even though SMEs have a large influence on the global economy, little attention has been paid to SMEs in the IC literature (Marzo & Scarpino, 2016). SMEs in developing countries like Indonesia play an important role in the country's economic growth. The Coordinating Ministry of Economic Affairs of the Republic of Indonesia (2021) noted that, as of 2021, there were 64.2 million SMEs in Indonesia, contributing 61.07% of the country's gross domestic product (GDP) — worth 8,573.89 trillion rupiahs. The contribution of SMEs to the Indonesian economy is able to absorb 97% of the total workforce and can collect up to 60.4% of the total investment.

There were several reasons for selecting SMEs in the manufacturing sector in this study. First, to achieve sustainability, manufacturing companies are required to be actively involved in environmental management. This requirement was imposed in response to strict international environmental regulations and the emergence of greater environmental awareness among consumers and other stakeholders. Second, despite the ongoing COVID-19 pandemic, the manufacturing industry in Indonesia as a whole continues to perform well, particularly with respect to its contribution to the nation's GDP. For example, in the third quarter of 2021, the Indonesian manufacturing industry contributed 17.33% of the country's GDP, the highest of any sector (Ministry of Industry of Republic Indonesia, 2021). Third, the manufacturing sector is vulnerable to environmental problems and, as such, is considered to be one of the main actors responsible for sustainability-related issues. Fourth, the implementation of innovation in the manufacturing sector, as a response to environmental pressures to undergo a green transformation, is urgently needed given the sector's high level of energy consumption.

This study aims to examine the relationship between each of the components of GIC and CSD. The research makes an important contribution to the IC literature by diagnosing gaps related to the role of GIC in building a sustainable enterprise. Research results can motivate managers to take corrective action in the management process. The findings of this study can stimulate interest in developing GIC and broaden the scope of implementing GIC practices in SMEs, particularly in developing countries.

The remainder of this paper is structured as follows. Section 2 presents a review of the relevant literature. Section 3 describes the methodology used in this study. Section 4 presents the results of the study, while Section 5 discusses these results in greater detail. Finally, Section 6 presents conclusions based on the results of the study, outlines the limitations of the study, and provides recommendations for future research.

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1. Green intellectual capital

GIC is understood as the total stock of all types of intangible assets, knowledge, capabilities, relationships, etc., about environmental protection or green innovation at the individual level and

organizational levels within a company (Benevene et al., 2021). The environmental concept has been accepted in contemporary business practice, the goal is to reduce environmental impact and manage climate transformation to increase inter-organizational motivation to be more productive toward green improvements. Huang and Kung (2011) claim that GIC helps organisations meet stringent international environmental regulations, create value for organisations and satisfy high customer demands regarding environmental issues.

There are three elements of GIC — namely green human capital (GHC), green relational capital (GRC), and green structural capital (GSC).

1. *GHC* is the sum of the knowledge, skills, abilities, experiences, attitudes, wisdom, creativity, and commitment of employees as related to environmental protection or green innovation (Chen, 2008). Environmental knowledge embedded in employees contributes to the company's compliance with external environmental pressures through the development of green innovation and green management.

2. *GRC* refers to customers, suppliers, and business partners as related to environmental management and green innovation (Huang & Kung, 2011). Chen (2008) defines GRC as a company's stock of interactive relationships with customers, suppliers, network members, and partners regarding corporate environmental management and green innovation. As companies are often pressured by external stakeholders to consider environmental issues, it is in their best interest to invest more resources in environmental management and to develop their relationships with external stakeholders in terms of shared environmental concerns.

3. *GSC* refers to the specification, empowerment, and supporting infrastructure as related to environmental protection or the development of a sustainability strategy (Huang & Kung, 2011). The GSC embedded in the organisation cannot be taken by employees when they leave the company. Chen (2008) suggests that GSC is a stock of organisational capabilities, organisational commitment, knowledge management system, managerial philosophy, organisational culture, corporate image, patents, copyrights, and trademarks with respect to environmental protection or green innovation in companies.

2.2. Corporate sustainable development

The World Commission on Environment and Development (1987) defines sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. In a highly dynamic internal and external environment, companies need resources and the ability to survive, in both the short and long term. These conditions require companies to shift to a sustainable development approach, one which can be implemented in sustainable development strategies, policies, procedures, and activities in the company's daily operations to create and maintain competitive advantage and address global problems and long-term challenges (Baumgartner & Korhonen, 2010). It was thereafter termed CSD.

Researchers agree that CSD can be explained via a framework that is represented by three dimensions — namely social, economic, and environmental development (Benevene et al., 2021; Bombiak, 2022).

1. *Social development (SD):* Social development refers to managing a company in such a way as to reduce social inequalities and divisions, improve quality of life, and strengthen relationships with various stakeholders (Chow & Chen, 2012). The company practices social development by assuming broader responsibilities towards various stakeholder groups and their social environment to better meet stakeholder needs and ensure their loyalty to the company (Baumgartner & Ebner, 2010). Active implementation of social responsibility becomes an inevitable choice for companies seeking sustainable development (Gennari, 2019).

2. *Economic development (ED):* In order for a company to survive indefinitely in the market, it must be able to create value while also paying attention to the local and social environment. ED is important for the company because it serves as a prerequisite for its very survival (Steurer et al., 2005). Economic sustainability involves increasing the profitability of companies through efficient use of resources, effective projects and undertakings, and good management practices (Bombiak, 2022).

3. *Environmental development (EnD):* Every company has an impact on the surrounding environment. Therefore, in the context of EnD, companies are required to consistently protect the environment by sparing the use of natural resources (Koval et al., 2021) and promoting renewable resources (Bombiak, 2022). Through integrity to the environment, human activities do not exhaust the Earth's land, air, and water resources. The essence of EnD is that the organisation is expected to operate with the support of the ecosystem while at the same time reducing environmental pollution and minimising resource consumption and the company's ecological footprint (Lindgreen et al., 2009). This shows that the priority of the business environment is related to the company's obligations for the impact of its actions on the use of available resources for productive activities and consumption. The aim is to ensure that operations are sustainable without harming the surrounding environment. Chow and Chen (2012) conducted research in mainland China. The results show that EnD has the highest path coefficient compared to SD and ED. This means that although SD and ED play a key role in CSD, EnD (such as ecological improvement and pollution reduction) is likely to be the most important CSD dimension emphasized in mainland Chinese organizations.

2.3. Hypotheses formulation

Although the literature has discussed the importance of IC and its implications, little is known about GIC and its implications in sustainability issues where environmental concerns are high on the agenda (Wang & Juo, 2021). This prompted the conduct of this study. The scope of this study is to examine the relationship between each GIC element, i.e., GHC, GRC, and GSC with each CSD dimension, i.e., SD, ED, and EnD.

2.3.1. GHC and CSD

GHC makes organisations socially aware and encourages employees to understand how different business activities affect the environment so that they can take immediate, effective steps to carry out their environmental responsibilities (Shah et al., 2021). The internalisation of GHC leads to the maintenance of good relations between the company and customers, the creation of social value, and the strengthening of the company's reputation. In this sense, GHC is a tool to efficiently manage customer relationships, provide products or services based on customer needs, and improve customer equity. Socially responsible companies thereby derive vital benefits, such as customer and employee satisfaction, excellent employee recruitment, and the emergence of innovation, all of which strengthen the company's social performance (Wagner, 2013).

H1a: GHC is positively related to SD.

Human resources play an important role when companies implement environmental management policies. GHC in a company can support the implementation of environmental management practices — for example, green supply chain management, including green manufacturing and logistics turnaround, in turn leading to the achievement of sustainability (Jabbour et al., 2019). GHC management helps companies to create highly motivated and dedicated employees, which consequently leads to the creation of economic value (Longoni et al., 2018).

H1b: GHC is positively related to ED.

Besides having a role in increasing economic value, GIC also plays an important role in environmental performance (Yusliza et al., 2020). Employee recruitment via the promotion of environmental friendliness will attract prospective employees with good qualifications to apply for a position at the company because of the company's good environmental practices. GHC can assist companies in identifying, embracing, and valuing their intangible resources to develop and implement responsive green strategies in order to improve environmental performance (Shah et al., 2021).

H1c: GHC is positively related to EnD.

2.3.2. GRC and CSD

GRC, which is a business intangible asset based on relationships with suppliers, customers, green innovation members, and pro-environmental associations, can help improve pro-environmental behaviour, make the organization and its employees care about how business activities affect it, and can be increased to make the organization more sustainable (Shah et al., 2021). Niesten et al. (2017) note that relationships with partners result in a more sustainable society. Relational capital plays an important role in social exchange because it enhances communication, and collaboration, and reduces opportunistic behaviour in the supply chain, thereby encouraging supply chain members to engage in value-added activities (Yu et al., 2020).

H2a: GRC is positively related to SD.

GRC, as an intangible asset of a company, is based on the relationship between the organisation, suppliers, customers, members, and partners of the green innovation network with regard to the management of the company's environment with the aim of achieving competitive advantage (Chen, 2008). Every organisation seeks to obtain information from its stakeholders by cultivating enhanced communication between partners and achieving better organisational results (Shah et al., 2021). Customers who are willing to pay more for green products are more inclined to have greater environmental awareness, which will consequently increase profits (Yu et al., 2020).

H2b: GRC is positively related to ED.

Relational capital, including GRC, has the potential to help integrate environmental knowledge towards achieving environmental performance (Hasan et al., 2021). Green collaboration helps to generate environmental awareness among partners, which can translate into better use of eco-friendly behaviour. Companies use GRC to build dialogue with their partners in order to reduce their environmental impact and deliver environmentally friendly goods, thereby increasing sustainability (Jermsittiparsert, 2021).

H2c: GRC is positively related to EnD.

2.3.3. GSC and CSD

Various aspects of the management and maintenance of IC within the company are in accordance with and complement the activities of corporate responsibility (Gallardo-Vázquez et al., 2019). Companies with strong structural capital will support green prospects, enabling the organisation and its employees to learn new skills and proactively seek to understand how tasks and duties can be performed in a responsive manner (Yussof et al., 2019). GSC in the form of information systems, policies, and strategies, helps GHC build skills and abilities to respond to the social environment.

H3a: GSC is positively related to SD.

Capabilities, organisational commitment, knowledge management systems, reward systems, information technology systems, databases, managerial institutions, operating processes, managerial philosophy, organisational culture, company reputation, patents, copyrights, and trademarks regarding environmental protection or green innovation within the company can help it to achieve competitive advantage (Chen, 2008). Companies that pay substantial attention to and invest in environmental management and green innovation not only avoid conflict with environmental groups and advocates or sanctions due to insufficient environmental protection but also improve their image, boost production efficiency, and develop new markets, which in turn have an impact on financial sustainability. Huang and Kung (2011) state that organisational structure or structural capital helps companies to reduce environmental violations and associated costs.

H3b: GSC is positively related to ED.

GSC assists organisations in implementing pro-environmental behaviours that result in improved environmental performance (Shah et al., 2021). GSC provides a platform for the acquisition of pro-environmental knowledge, the capacity to determine the extent to which an organisation's

activities help or harm the environment, and clarification concerning ways in which environmentally sensitive activities can be improved (Huang & Kung, 2011). GSC also provides a mechanism by which the effects of different organisational activities can be better understood and thereby establishes supportive systems, policies, and infrastructure to minimise their environmental impacts, thereby bolstering environmental responsibility (Shah et al., 2021).

H3c: GSC is positively related to EnD.

3. RESEARCH METHODOLOGY

3.1. Sample and data collection

Companies in the medium manufacturing industry in Bali Province comprised the sample used for this research. Data from Statistics of Bali Province (BPS, 2022) show that, based on the number of workers, 290 companies are included in the medium manufacturing industry, which has 20 to 99 workers. Simple random sampling was employed to generate the research sample. The sample size of 168 medium enterprises was determined using the sample size determination formula of Yamane (1973).

$$n = \frac{N}{1 + N(e)^2} = \frac{290}{1 + 290(0.05)^2} = 168 \qquad (1)$$

Data were collected using a direct questionnaire sent to chief executive officer (CEOs) who represented the company as the research respondent. Based on the assumption of a response rate of 80%, 210 questionnaires were sent. We began receiving questionnaire responses three weeks after the questionnaire had been sent. Of the 210 questionnaires delivered, 101 were returned and processed, resulting in a usable response rate of 48.09%.

We conducted a non-response bias test on respondents who completed the questionnaire on time and on those who did not to determine whether there were differences in the characteristics of these two types of respondents. In this study, respondents who returned answers to the questionnaire after the specified time were considered to represent the answers of non-response respondents. The t-value on equal variance was assumed to be 0.624 with a significance of 0.534 > 0.05 (Table 1). This indicates that there was no difference in scores between the returning and non-returning questionnaire groups. It can therefore be concluded that non-response bias was not an issue.

Table 1. Non-response bias results

		Levene's test for equality of variances		*T-test for equality of means*						
		F	*Sig.*	*t*	*df*	*Sig. (2-tailed)*	*Mean difference*	*Std. error difference*	*95% confidence interval of the difference*	
									Lower	*Upper*
Total	Equal variances assumed	1.052	0.307	0.624	99	0.534	3.005	4.816	-6.551	12.561
	Equal variances not assumed			0.541	25.172	0.593	3.005	5.551	-8.424	14.434

Most of the respondents who participated in this study were male (85.14%), had more than five years of work experience (73.26%), and held a bachelor's degree (65.34%).

3.2. Measurement of the constructs

The measurement of GIC, including *GHC*, *GRC*, and *GSC* using instruments from Huang and Kung (2011). *GHC* and *GRC* were measured by five items each, while *GSC* was measured by eight items. The measurement of CSD employed instruments from Chow and Chen (2012), which included *SD*, *ED*, and *EnD*; *SD* and *ED* were measured by six items, while *EnD* was measured by ten items. All instruments were assessed on a 5-point Likert scale with 1 (strongly disagree) to 5 (strongly agree).

The responses of the participants to the research variables were similar. The mean values in Table 2 are 4.14 (*GHC*), 4.16 (*GRC*), 4.26 (*GSC*), 4.37 (*ED*), 4.29 (*SD*), and 4.35 (*EnD*), which indicates that the average respondent agreed with the measurement items for the research construct.

Table 2. Descriptive statistics for the research variables

Variable	*Theoretical score*		*Actual score*		*Mean*	*SD*
	Min	*Max*	*Min*	*Max*		
GHC	1.00	5.00	2.20	5.00	4.14	0.65
GRC	1.00	5.00	2.00	5.00	4.16	0.65
GSC	1.00	5.00	2.00	5.00	4.26	0.61
ED	1.00	5.00	2.17	5.00	4.37	0.63
SD	1.00	5.00	2.17	5.00	4.29	0.58
EnD	1.00	5.00	2.10	4.90	4.35	0.55

3.3. Data analysis

The hypotheses were tested with a partial least squares structural equation modeling (SEM-PLS) using WarpsPLS 8.0. SEM-PLS can test several independent and dependent variables simultaneously.

Apart from using SEM-PLS, data analysis can also be carried out using a covariance-based structural equation modeling (CB-SEM) using AMOS or LISREL software.

4. RESULTS

4.1. Measurement model analysis

Composite reliability and Cronbach's alpha were used to assess reliability in this study. Table 3 shows that the minimum requirements for reliability were met, which exceeded 0.70 for composite reliability and Cronbach's alpha values (Fornell & Larcker, 1981).

This study tested construct validity by testing convergent validity and discriminant validity. The average variance extracted (AVE) value that is more than 0.50 indicates fulfilment of convergent validity (Fornell & Larcker, 1981).

Table 3. Reliability and convergent validity

Measure	*GHC*	*GRC*	*GSC*	*SD*	*ED*	*EnD*
Composite reliability	0.897	0.893	0.930	0.906	0.910	0.928
Cronbach's alpha	0.857	0.850	0.913	0.876	0.881	0.913
Average variance extracted	0.636	0.625	0.623	0.617	0.628	0.563

The AVE value of all research constructs in Table 3 confirms that convergent validity was fulfilled. The loading value of each indicator also demonstrates the fulfilment of convergent validity. Combined loadings and cross-loadings in Table 4 show that the value of outer loading in this study exceeded 0.70 and was significant. Therefore, convergent validity for the reflective construct in this study was fulfilled as, according to Hair et al. (2013), an outer loading must be above 0.70, and the p-value must be significant (< 0.05), as a condition of convergent validity for the reflective construct.

Table 4. Combined loadings and cross-loadings

Indicator	*GHC*	*GRC*	*GSC*	*SD*	*ED*	*EnD*	*P-value*
GHC1	**(0.788)**	0.277	0.086	0.000	-0.046	0.081	< 0.001
GHC2	**(0.794)**	0.025	-0.117	0.085	0.102	-0.065	< 0.001
GHC3	**(0.776)**	-0.025	0.047	-0.132	-0.028	-0.051	< 0.001
GHC4	**(0.854)**	-0.063	-0.074	-0.034	-0.097	-0.014	< 0.001
GHC5	**(0.775)**	-0.212	0.068	0.084	0.078	0.049	< 0.001
GRC1	0.301	**(0.770)**	0.062	-0.118	0.007	0.071	< 0.001
GRC2	0.031	**(0.788)**	0.158	-0.094	-0.151	-0.133	< 0.001
GRC3	-0.256	**(0.791)**	-0.034	-0.008	-0.003	0.050	< 0.001
GRC4	-0.055	**(0.803)**	-0.264	0.144	0.185	0.030	< 0.001
GRC5	-0.012	**(0.801)**	0.083	0.069	-0.041	-0.017	< 0.001
GSC1	0.038	0.007	**(0.770)**	0.081	-0.071	0.060	< 0.001
GSC2	0.363	0.030	**(0.807)**	-0.057	-0.097	-0.001	< 0.001
GSC3	0.411	0.038	**(0.776)**	0.001	-0.151	-0.067	< 0.001
GSC4	0.037	0.038	**(0.779)**	0.049	-0.055	0.130	< 0.001
GSC5	-0.303	-0.030	**(0.785)**	-0.043	0.079	-0.020	< 0.001
GSC6	-0.244	-0.082	**(0.813)**	0.015	0.173	-0.086	< 0.001
GSC7	-0.068	-0.018	**(0.781)**	0.002	-0.040	0.066	< 0.001
GSC8	-0.225	0.019	**(0.800)**	-0.045	0.153	-0.074	< 0.001
SD1	-0.202	0.104	0.094	**(0.760)**	-0.069	0.142	< 0.001
SD2	0.093	-0.009	-0.162	**(0.790)**	0.000	-0.061	< 0.001
SD3	0.102	-0.057	0.075	**(0.820)**	-0.154	-0.166	< 0.001
SD4	0.118	-0.180	0.170	**(0.760)**	0.203	-0.134	< 0.001
SD5	0.018	0.186	-0.068	**(0.815)**	0.057	-0.040	< 0.001
SD6	-0.142	-0.052	-0.102	**(0.765)**	-0.028	0.277	< 0.001
ED1	0.038	-0.024	0.112	0.010	**(0.826)**	0.092	< 0.001
ED2	-0.125	0.141	-0.067	0.021	**(0.808)**	0.057	< 0.001
ED3	0.038	0.059	-0.041	-0.053	**(0.753)**	0.060	< 0.001
ED4	0.091	0.013	-0.072	0.000	**(0.773)**	-0.091	< 0.001
ED5	0.000	-0.080	0.089	-0.030	**(0.786)**	-0.133	< 0.001
ED6	-0.037	-0.106	-0.028	0.048	**(0.807)**	0.010	< 0.001
EnD1	-0.266	0.251	0.033	-0.023	0.183	**(0.765)**	< 0.001
EnD2	0.118	-0.101	-0.135	0.056	0.091	**(0.658)**	< 0.001
EnD3	0.190	-0.020	0.052	-0.092	0.003	**(0.760)**	< 0.001
EnD4	0.160	0.170	-0.158	0.063	-0.125	**(0.738)**	< 0.001
EnD5	-0.021	0.046	0.055	0.019	-0.008	**(0.798)**	< 0.001
EnD6	-0.261	-0.058	-0.026	0.308	-0.017	**(0.729)**	< 0.001
EnD7	-0.213	-0.143	0.087	0.117	0.162	**(0.755)**	< 0.001
EnD8	0.067	0.038	-0.070	-0.208	-0.075	**(0.774)**	< 0.001
EnD9	0.089	0.059	0.054	-0.120	-0.171	**(0.750)**	< 0.001
EnD10	0.145	-0.255	0.082	-0.095	-0.036	**(0.769)**	< 0.001

Discriminant validity requirements are met if the loading value of one construct (cross-loading) is lower than that of the construct on which it is loaded. For example, in Table 4, the loading value of *GHC1* to the *GHC* construct (0.788) is greater than the value of its cross-loading to other constructs — *GRC, GSC, SD, ED,* and *EnD*. Based on the results in Table 5, it was concluded that discriminant validity was met.

4.2. Structural model analysis

The results of the full model test (Table 5) show that *GHC* was significantly positively related to all dimensions of CS — *SD, ED,* and *EnD*. The coefficient of *GHC* on *SD* is 0.213 ($p = 0.013$), on *ED* is 0.297 ($p < 0.001$), and on *EnD* is 0.308 ($p < 0.001$). Therefore, *H1a, H1b,* and *H1c* were all confirmed.

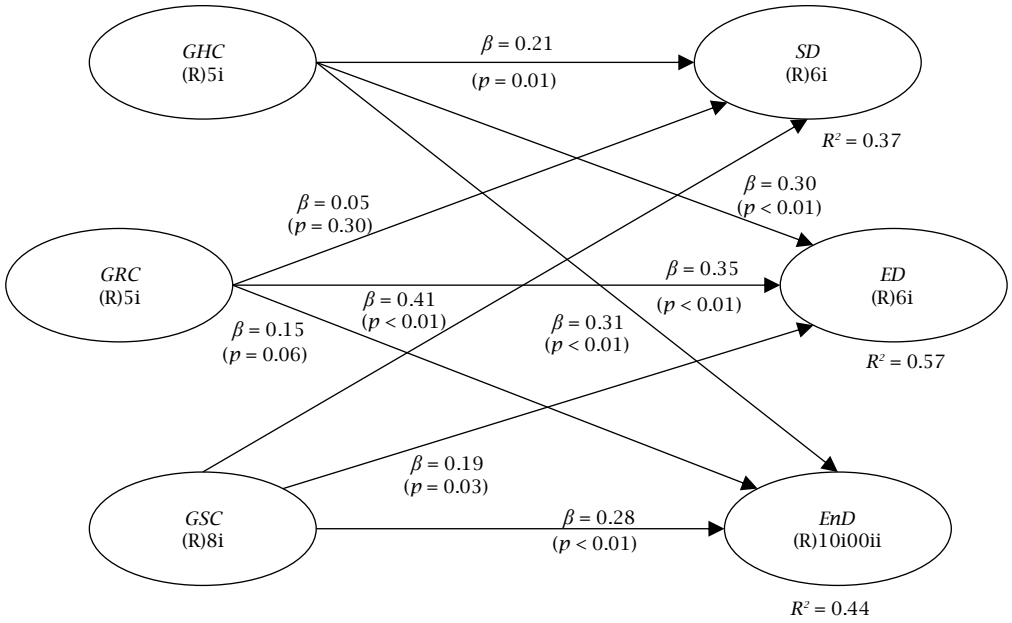
Table 5. PLS results for path GIC to CSD

Variable	*Path to*		
	SD	*ED*	*EnD*
GHC	0.213 (p = 0.013)	0.297 (p < 0.001)	0.308 (p < 0.001)
GRC	0.051 (p = 0.301)	0.354 (p < 0.001)	0.150 (p = 0.060)
GSC	0.406 (p < 0.001)	0.187 (p = 0.025)	0.280 (p = 0.002)
R-squared	0.365	0.572	0.438

The significant positive relationship between *GRC* and *ED* (β = 0.354; p < 0.001) confirmed *H2b*. Meanwhile, *H2a* and *H2c* were not statistically proven, as indicated by the insignificant positive relationship between *GRC* and *SD* (β = 0.051; p = 0.301) and *EnD* (β = 0.150; p = 0.060). Another finding in the full model test was that there was a significant positive relationship between *GSC* and all dimensions of *CSD*, namely *SD* (β = 0.406; p < 0.001), ED (β = 0.187; p = 0.025) and *EnD* (β = 0.280; p = 0.002).

The coefficient of determination is revealed by R-squared, which explains the percentage of variance in the endogenous/criterion construct that can be explained by the construct hypothesised to affect it (exogenous/predictor). Table 5 shows that the *SD* variance can be explained by the variance in the three GIC dimensions — *GHC*, *GRC*, and *GSC* — by 36.5%. The three IC dimensions are also able to explain the *ED* variance of 57.2% and the *EnD* variance of 43.8%. From the three values of the coefficient of determination, it can be concluded that of the three dimensions of CSD, *ED* is the dimension whose variance can be explained by the greatest GIC compared to the other CSD dimensions.

Figure 1. PLS results



Tests of practical significance and the estimation of the extent to which the statistical findings in this study represent the population were carried out by means of an effect size test, the results of which are shown in Table 6.

Table 6. Effect size test results

Variable	*GHC*	*GRC*	*GSC*
SD	0.106	0.025	0.234
ED	0.199	0.247	0.126
EnD	0.185	0.084	0.169

Table 6 shows that there is no effect size value less than 0.02, which in turn indicates that there is no effect that is too weak to be considered relevant from a practical point of view (Kock, 2014). According to Kock (2014), there are three categories of effect size values — namely weak (0.02), medium (0.15), and large (0.35). The effect size values in Table 6 reveal that most of the effect size values are in the medium category.

5. DISCUSSION

The significant positive relationship between GHC and all CSD dimensions demonstrates that human resources are an important resource with a major contribution to sustainability (Karchegani et al., 2013) and proper development (Massaro et al., 2018). These findings confirm the findings of Chen (2008), Huang and Kung (2011), Chen and Chang (2013), Yong et al. (2019), and Astuti and Datrini (2021),

which found a significant contribution of GHC to various types of business performance. The knowledge, skills, abilities, experiences, attitudes, wisdom, creativity, and commitment of company employees in medium-sized companies in Bali Province regarding environmental protection or green innovation play an important role in the company's social sustainability. GHC supports companies in reducing social inequalities and divisions, improving quality of life, and strengthening relationships with various stakeholders. Organisations must practice corporate social sustainability by assuming broader responsibilities towards different stakeholder groups and the social environment to better meet stakeholder needs and ensure their loyalty (Baumgartner & Ebner, 2010).

The existence of green knowledge resources within employees allows them to manage the company in such a way that it can survive indefinitely in the market by making a positive contribution to the economic circumstances and interests of stakeholders. Organisations that are actively involved in green innovation can improve productivity and organisational image and make it possible to charge higher prices for green products (Chen et al., 2006). Companies with more competent employees will earn higher profits than their competitors, thereby positively affecting company performance and output as well as a competitive advantage (Hitt et al., 2001).

GHC in a medium-sized manufacturing company in Bali Province also strengthens the various efforts a company makes to manage its operations in such a way that its products do not damage the environment, including soil, air, and water. With the support of GHC, companies can reduce energy consumption, minimise waste and emissions from operations, mitigate the environmental impact of their products/services, and take voluntary actions — e.g., actions not required by regulations — towards environmental restoration, among related practices. In relation to the challenges faced by companies in pursuing environmental goals, green human resource management helps direct the attention and behaviour of employees to achieve sustainability goals concerning environmental performance (Ramus & Steger, 2000). These findings support Rayner and Morgan (2017), who assert that green staff members contribute significantly to bolstering the environmental effectiveness and sustainable development of organisations. Organisations benefit from employee knowledge and skills to stimulate sustainable development based on reduced energy consumption and production and material waste (Bombiak, 2022).

This study found that GRC was significantly positively associated with ED. This finding indicates that the interactive relationship of medium-sized manufacturing companies in Bali Province with customers, suppliers, network members, and partners regarding the company's environmental management and green innovation makes a significant contribution to the development of sustainable economic performance. This can be seen, for example, in the company's ability to sell waste products to generate income. The company is also able to reduce input and waste management costs for the same level of output. In addition, companies can also differentiate processes/products based on marketing efforts of process/product environmental performance. These findings are in line with several previous studies, such as Chen (2008), Yong et al. (2019), and Astuti and Datrini (2021), which found significant contributions of GRC to various types of business performance. The results of this study also confirm the findings of Massaro et al. (2018), which found that relational capital can support economic sustainability.

GRC was found to have no significant relationship with SD or EnD. Although the company is capable of designing products or services according to the environmental demands of customers, which, in doing so, would make the customers more satisfied with the company's efforts at environmental protection, not all companies can communicate their environmental impacts and risks to the general public. GRC has also not been effective in encouraging companies to build partnerships in order to reduce environmental impacts. This insignificant relationship has several potential causes. Most SMEs lack resources and have a low interest in environmental management (Yacob & Moorthy, 2012). In addition, most SMEs tend to ignore the new concept of GRC. SMEs worldwide have little knowledge of environmental management and do not understand the concept of environmental management (Moorthy et al., 2012). It is very difficult for SMEs to see a clear relationship between implementing an environmental management system and deriving benefits from it (Weerasiri & Zhengang, 2012).

In this study, GSC had a significant positive relationship with all dimensions of CSD — i.e., SD, ED, and EnD. GSC, which includes intangible resources, legal assets, and databases, such as a green organisational culture and philosophy, an environmental knowledge management system, and processes, methods, and structures related to environmental protection and supporting green initiatives, are related to the company's social sustainability. GSC companies in medium-sized industries in Bali Province positively contribute to all current and future relationships with stakeholders to ensure stakeholder loyalty to the company. Having a superior environmental protection management system, supported by a special team designed to deal with issues related to environmental protection, allows companies to improve the health and safety of employees and/or the community. This supports the claim made by López-Gamero et al. (2011) that strong structural capital, active involvement by companies in environmental issues, and the adoption of new technologies are often required by organisations to achieve sustainability.

The relationship between GSC and ED indicates that with the emergence of global environmentalism, environmental knowledge, and culture embedded in organisations play a key role in the capacity of companies to formulate and implement environmental strategies to seek new opportunities or gain new competitive advantages (Chang & Chen, 2012). A green culture in the company leads to an optimistic environmental impact, greater employee well-being, increased sales, and reduced costs (Chaudhry & Chaudhry, 2022). The findings of this study are in accordance with those of Chen (2008) and Astuti and Datrini (2021), who found

a significant positive relationship between green structural capital and competitive advantage. This research also supports Chaudhry and Chaudhry (2022), who found a significant positive effect of GSC on the company's economic sustainability.

GSC, which was found to be significantly positively related to EnD, demonstrates that increasing GSC can help transform ideas into operational activities for the purpose of environmental safety. Environmental management is an important element of GSC, with an orientation towards green products and the implementation of environmentally friendly manufacturing processes (Bombiak, 2022). The implementation of environmental management strategies, such as conducting environmental reviews, designing action schemes, planning the implementation of adopted tasks, and providing appropriate staff, constitute the company's efforts to support the ecosystem by reducing environmental pollution and minimising resource consumption and the company's ecological footprint. Medium-sized manufacturing companies recognise the important role of GSC for CSD. It is believed that sustainability requires organisations to address new market challenges, and as such GSC is essential to supporting this process (Yussof et al., 2019).

6. CONCLUSION

Through rigorous statistical testing, the research findings confirm that GHC and GSC have a significant positive relationship with each dimension of CSD. The good quality of green-based intangible companies, namely GHC and GSC encourages the company's social, economic, and environmental sustainability. These findings provide evidence that GHC and GSC have an important role in the development of corporate sustainability. In order to be socially, economically, and environmentally sustainable, it is very important for SMEs in developing countries, especially in medium-size manufacturing companies in Indonesia, to be able to use green knowledge in the form of GHC and GSC efficiently to increase their innovation potential. SMEs can take advantage of various forms of innovation capabilities, for example relying on the ability to produce product innovations or establish several actions that can contribute to innovation capabilities (Saunila, 2020).

This study also found that GRC had a significant positive relationship with ED. These findings prove that the role of GRC in a company's economic sustainability cannot be ignored. Relational capital assists supply chain members in sharing knowledge and information about green manufacturing, collaborating on environmental protection, re-engineering business processes to reduce carbon emissions, and making relationship-specific investments in green technology and innovation (Geng et al., 2017), thereby encouraging supply chain members to engage in activities creation of added value (Zhang et al., 2018), one of which is economic value. Another finding of this study is that GRC has a positive and not significant relationship with SD and EnD. This finding has implications for executives and managers in SMEs to better utilize relational capital to promote the integration of environmental knowledge to improve environmental performance (Zahoor & Gerged, 2021) and social performance.

The findings of this study indicate that GIC is a business resource for SMEs, especially medium-sized manufacturing companies, which plays an important role in ensuring survival and competitive success, especially in the contemporary knowledge era and sustainable development. Thus, companies should concentrate more on developing and strengthening the accumulation and management of GIC resources in combating environmental problems and maintaining their competitiveness and sustainability. This study contributes to the existing literature by identifying gaps associated with the role of GIC in building a sustainable enterprise. Moreover, the study helps address knowledge deficiencies concerning SMEs, particularly medium-sized enterprises, as most previous research was conducted on larger organisations. Therefore, it is important to fill the research gap, given the important contribution of SMEs to the country's economy.

The results of this study can motivate managers to take corrective actions in the management process. Further, the research findings may stimulate increased interest in GIC development and could broaden the scope of the application of GIC development practices to SMEs, especially in medium manufacturing industries. Identifying the correlation between GIC and CSD enhances understanding of how companies can achieve sustainable results through the strategic management of their GICs.

This study has several limitations that provide directions for further research. First, the research was only conducted in the context of developing countries, companies in the Indonesian medium manufacturing industry, and thus the generalisation and validation of the findings are limited. Therefore, it is necessary to conduct similar research in the context of other developing — or developed — countries for the purpose of determining whether the findings of the current study are generalizable and valid. Second, this study employed a small sample, even though the response rate was 48.09%. Therefore, it is advised that future studies use larger sample sizes for the purpose of confirming the present findings. Lastly, the current study employed cross-sectional data. Future longitudinal studies and interview-based approaches are recommended in the interest of providing more meaningful insights into changes in GIC over time.

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