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DETERMINANTS OF SUSTAINABILITY PERFORMANCE AND THE ROLE OF GREEN INNOVATION BASED ON NATURAL RESOURCES BASED VIEW THEORY

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Abstract: Many factors influence sustainability performance in State-Owned Enterprises (SOEs), including financial and non-financial aspects. Based on the natural resource-based view theory, this study aims to develop measurements for dimensions and indicators of the impact of Green Intellectual Capital (GIC), Green Organisational Identity (GOI), and Green Innovation (GI) on sustainability performance. A quantitative approach was employed, using structural equation modelling with SmartPLS4 software. The findings show that GIC and organisational identity significantly influence GI. Furthermore, these factors and GI positively and significantly affect sustainability performance. GI also mediates GIC, GOI, and sustainability performance. These results highlight the importance of adopting a GOI and enhancing GIC and innovation in SOEs to achieve Sustainable Performance (SP). The study provides practical implications for the government and SOEs, emphasising the need to continuously develop and monitor green initiatives. Doing so can positively impact the achievement of sustainability performance in SOEs, ensuring their long-term viability and contribution to sustainable development goals.

Keywords: Natural resource-based view, green intellectual capital, green organisational identity.

Introduction

Compared to the 2022 EPI rankings in Asia Pacific, Indonesia is ranked 22nd out of 25 countries. The score shows that the ecosystem vitality score is 34.1, the environmental health score is 25.3, and the climate change mitigation policy score is 23.2 out of 100. This low score shows that Indonesia prioritises economic growth over environmental sustainability (Ahdiat, 2022). Furthermore, based on information from the word data (Mutia, 2022), it is stated that Indonesia is the fifth largest carbon emitter. Based on Figure 1, the United States and China still rank first and second as countries producing the most significant carbon emissions. In 2021, the United States produced 509,143 $GtCO_2$ and Indonesia produced 102,562 $GtCO_2$.

Indonesia, as the leader of the G-20 in 2022, raised three priority issues regarding the environment. One of the goals is net zero emissions by 2050. Note that sustainable corporate performance combines three harmonious corporate goals the company wants to achieve (Rizki *et al*., 2022). It also applies to State-Owned Enterprises (SOEs). SOEs also have environmental, social, and financial preservation goals. Other than that, SOEs are also among the largest carbon emitters. Seven SOEs in 2022 contributed 20% of carbon emissions in Indonesia, namely Pertamina, PLN, Pupuk Indonesia, Semen Indonesia, PTPN, Perhutani, and MIND ID (Fajrian, 2023).

Mohsin Khan's research (2022) states that culture, which is part of a company's identity

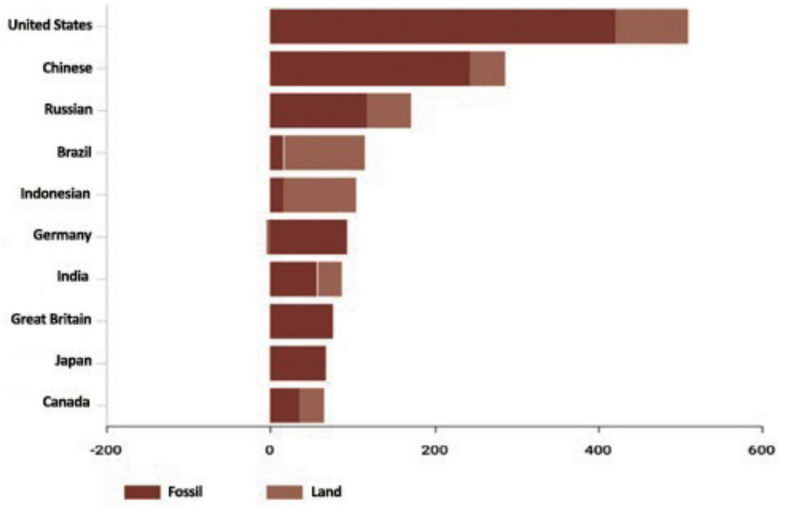

Figure 1: Countries with the largest carbon emissions

will increase innovation and task performance, which is part of job performance, represented in intellectual capital. Several researchers have researched the relationship between Green Intellectual Capital (GIC) and sustainability performance. Rizvi (2021) examined the relationship between GIC and environmental sustainability performance, which showed a relationship between GIC and environmental sustainability performance. It supports the findings of previous research conducted by Yadiati *et al*. (2019).

Yusliza *et al*. (2020) also discovered that GIC positively affects economic, environmental, and social sustainability performance. Slightly different from the research above, Zalfa and Novita (2021) in their research tested the components of GIC according to C. C. Liu (2010), which resulted in the finding that Green Human Capital (GHC) was examined to have a negative influence on Sustainability Performance, Green Structural Capital (GSC) did not affect Sustainability Performance and Green Relational Capital (GRC) was found to have a positive influence on Sustainability Performance (SP).

Furthermore, achieving Sustainable Performance (SP) is always associated with environmental issues in the company's business processes. Companies that compete today must be able to carry out efficient, effective operational processes and always focus on environmental sustainability. Therefore, environmentally friendly (green) innovation is essential for SP. According to Elzek *et al*. (2021), the term Green Innovation (GI) is often equated with the terms sustainable innovation, ecological innovation, and environmental innovation (Halila & Rundquist, 2011; Dias Angelo *et al*., 2012; Hojnik *et al*., 2018).

Reid and Miedzinski (2008) and Elzek *et al*. (2021) state that GI is any solution offered at any product or service life cycle to include significant resource improvements while reducing environmental impacts. Several authors have studied the relationship between GI and sustainability performance. Alternatively, Asadi *et al*. (2020a) determined that GI significantly and positively affects environmental and economic performance. This finding is also supported by Elzek *et al*. (2021), who found that GI significantly affects sustainability performance. Fitriani (2015), in her research, established something different, namely that GI does not significantly affect company performance. Fitriani's findings are supported by Tay and Sundiman (2021), who produced similar results, stating that GI does not significantly affect sustainability performance.

Natural resource-based view theory emphasises that resources must be valuable or valuable, unique or rare, inimitable, and supported by socially and naturally complex organisational skills or processes to provide opportunities for SP improvement. These can create the potential for sustainable benefits. Based on the natural resource-based view theory, Dinarjito and Ahmar (2023), several studies have concluded that there is a relationship between Green Organisational Identity (GOI) and GI. Yousaf *et al*. (2022) assessed a significant positive relationship between GOI and innovation. It supports previous research conducted by Mushtaq *et al*. (2019) and Soewarno *et al*. (2019). Similar results were also discovered in the research of C. H. Chang and Chen (2013). Research by Zehir and Ozgul (2020) established that GOI significantly affects company performance through GI. In contrast to the research above, Hatta and Parahyanti (2016) stated that organisational identity does not significantly affect innovation behaviour.

Research linking GOI, GIC, and GI with sustainability performance has been conducted by several authors. However, it has yet to explicitly examine SOE's performance and has yet to be conducted together. This study's vital contribution (novelty) is developing measurements of the variables used. Sustainability performance in previous studies, which consists of financial, economic, social and environmental dimensions is developed by adding the assignment dimension. The assignment dimension is added considering that SOEs receive special assignments and carry out activities that other companies cannot. Based on the explanation in the background above, the objectives of this study include: (1) Does GIC affect sustainability performance? (2) Does GOI Affect sustainability performance? (3) Does GI affect sustainability performance? (4) Does GIC affect GI? (5) Does GOI affect GI? (6) Does GI mediate the relationship between GIC and sustainability performance?, and (7) Does GI mediate the relationship between GOI and sustainability performance?

Literature Review

In measuring GIC, Y. S. Chen (2008) uses three dimensions, namely GHC, GSC, and GRC. Y. S. Chen's (2008) measurement concept has been widely used by previous studies such as Huang and Kung (2011), C. Chang and Chen (2012), Firmansyah (2017), Yusliza *et al*. (2020), and others. Rizvi (2021) states that GIC is directly related to environmental sustainability performance. Khan *et al*. (2020) state that human resource management practices that produce intellectual capital will directly influence sustainability performance. Khan's research is also supported by Awwad Al-Shammari *et al*. (2022). In their research in Ghana, Boso *et al*. (2022) stated that GIC significantly influences environmental sustainability performance. Yusoff *et al*. (2019) stated that a company needs to improve the quality of human resources efficiently to create better performance. Research by Yusliza *et al*. (2020) stated that GHC significantly positively affects Sustainability Performance. It also happened in the research of Zalfa and Novita (2021) and T. Widyastuti *et al*. (2021), which showed that GHC positively impacts sustainability performance.

Natural resource-based view theory has become a major theoretical perspective in strategic management. The natural Resource-Based Theory (RBT) focuses on the company's internal factors that lead to the principle of sustainability. Natural resource-based view theory marks strategic thinking by placing emphasis on the decisions and competencies of the company to preserve the natural environment. Research by Yong *et al*. (2019) explains that GRC is an interactive relationship between a company and its customers, suppliers, network members, and partners regarding corporate environmental management and GI, which enables it to create wealth and gain a competitive advantage. Research by Yusoff *et al*. (2019) shows that GRC positively affects business sustainability. These results are also supported by research by Zalfa and Novita (2021) and T. Widyastuti *et al*. (2021). Research by Thiagarajan *et al*. (2017) produces more detailed conclusions. GHC

positively affects operational, environmental, social, and governance performance. GSC has a positive effect on operational, environmental, social, and governance performance and GRC has a positive effect on social performance.

H1: Green Intellectual Capital Influences Sustainability Performance.

The current company goal is sustainability performance. A GOI can help companies realise two main business goals today: To continue to seek profit and to protect the environment (Firmansyah, 2017). GOI is an interpretation scheme of environmental management and protection whose members collectively develop their behaviour towards the environment (Y. Chen, 2011). According to C. H. Chang and Chen (2013), GOI is crucial to the context of interpretation in an organisation related to environmental management. In their research, C. H. Chang and Chen (2013) stated that GOI directly affects GI, which will later affect sustainability performance. Zehir and Ozgul (2020) determined that GOI has a direct positive effect on firm performance and a direct positive effect on GI, which will also have a positive effect on GOI.

H2: Green Organisational Identity Influences Sustainability.

The natural resource-based view theory argues that there are three main strategic capabilities, namely pollution prevention, product stewardship, and sustainable development. Note that each has a different environmental driving force is built on different core resources and has different sources of competitive advantage to drive improved sustainability performance, one of which is shown by GI. GI reflects the steps taken to reduce the adverse effects of production and operations on the environment, emphasising improving processes, technologies, systems, products, and management methods (Chen *et al*., 2018). Suppose businesses transform their production and services to provide more choices for customers and help them live more sustainable lives. In that case, they will have a central role in shaping a more sustainable future. Business sustainability is reflected in the implementation of strategies and activities that can meet the current requirements of economic entities and their beneficiaries while at the same time protecting, maintaining, and enhancing human and natural resources for the future (Labuschagne *et al*., 2005). With the development of sustainable innovation carried out by companies, the company's sustainability goals will be achieved in terms of economic, social, operational, and environmental goals. Asadi *et al*. (2020b), in their research in Malaysia, showed that GI significantly positively affects SP, GEP, GENP, and GEP. Elzek *et al.* (2021) also did the same thing, which resulted in the finding that GI positively influences GOI.

H3: Green Innovation Influences Sustainability Performance.

SP achievement is also inseparable from intellectual capital and organisational identity, focusing on the environment. Hence, achieving innovation and company goals must be balanced with the excellence of its employees, which is often reflected in intellectual capital (Firmansyah, 2017). Companies must encourage environmental management to realise GI and SP. Firmansyah (2017) states that GIC is a source of innovation. Human resources are one of the factors that influence the success of a company's innovation. Alternatively, Ali *et al*. (2021) research on manufacturing companies in Pakistan examined how GIC positively affects GI. The same thing was also assessed in the research of D. Liu *et al*. (2022), which stated that three dimensions of GIC positively affect GI. In his research, Danping Liu (2022) established that GHC, GSC, and GRC positively affect GI.

H4: Green Intellectual Capital Influences Green Innovation.

Talke *et al*. (2010) argue that companies that aim to bring renewal and innovation within the company must increase knowledge, skills, abilities, and expertise because it has been proven to influence the success of innovation. Dougherty (1990) explains that organisational identity can present similarities between individuals that generate enthusiasm for

innovation to satisfy customers. Alternatively, Yousaf *et al*. (2022) discovered a significant positive relationship between GOI and GI. It supports previous research conducted by Mushtaq *et al*. (2019) and Soewarno *et al*. (2019). Similar results were also found in the research of C. H. Chang and Chen (2013). On the other hand, Hatta and Parahyanti (2016) argue that the factors that influence innovation behaviour more are internal individuals in the company. The corporate identity embedded in individual company employees will foster environmentally friendly innovation. Green corporate identity can be internal and external, as discussed above.

H5: Green Organisational Identity Influences Green Innovation.

Sustainability performance improvement is directed at the company's reputation based on environmental awareness, indirectly improving its ability to manage organisational resources and the natural environment. An increased reputation means that the combination of resources and capabilities in all different parts of the company will be more profitable, especially since attention to the natural environment becomes the company's focus on achieving organisational goals. The wealth of the company and its employees is stored in its intellectual property, which is used to develop innovations to achieve sustainability performance goals. To prove this, research from Asiaei *et al*. (2023) determined that GHC, GSC, and GRC significantly and positively affect environmental sustainability performance through GI. Research from Marco-Lajara *et al*. (2022) is supported by the opinion of Asiaei *et al*. (2023) that GI successfully mediates GIC in positively influencing sustainability performance.

H6: Green Intellectual Capital Influences Sustainability Performance through GI.

Organisational identity is the basis of the company and the company's goals. Hence, identity is needed to show the company's characteristics when building interactions with internal and external parties. Organisational identity will help employees understand how they interact according to the values that characterise the company, which will later be used to achieve its goals. The company's current goal is SP. Therefore, with the formation of a GOI, it is hoped that it will increase environmentally-based innovation, which will later impact SP. In their research, C. H. Chang and Chen (2013) stated that GOI directly affects GI, which will later affect GOI. Research by Zehir and Ozgul (2020) discovered that GOI significantly affects company performance through GI. Consequently, Fatoki (2021) and Xing *et al*. (2019) assessed that GI has mediated the relationship between GOI and corporate environmental performance. Fatoki (2021) also demonstrated that GI mediates the relationship between green organisational culture and environmental performance.

H7: Green Organisational Identity Influences Sustainability Performance through Green Innovation.

Materials and Methods

The type of research used is quantitative research. The unit of analysis in this study is the manager of the parent company of the SOEs, who acts as the research respondent. The variables used in this study consist of independent, dependent, and intervening variables, which are explained as follows: (1) Dependent variable: Sustainability performance, (2) independent variable: GIC and GOI, and (3) intervening variable: GI. This study uses a survey in the form of a questionnaire to assess respondents perceptions. Measurement of variables using a Likert scale of 1-5 from several statements or questions related to the research variables. Note that the sampling used as respondents will use non-probability sampling with a purposive sampling technique. Non-probability sampling is a sampling technique that prevents population members from having different opportunities to become samples (Chandrarin, 2017). The sample studied in this study was 227 respondents and the statistical testing tool used is SmartPLS4.

Results and Discussion

Evaluation of the measurement model, as seen from the accepted Loading Factor (LF) value, is ≥ 0.70 (J. Hair *et al*., 2021). The level of reliability of the research variables is seen from the Composite Reliability (CR) measure ≥ 0.70 and convergent validity is seen from the Average Variance Extracted (AVE) measure ≥ 0.50 (J. Hair *et al*., 2021). In addition, the evaluation of the measurement model also requires a discriminant validity check, namely checking that the variables are statistically tested and different from other variables. The statistical measure for discriminant validity is the Fornell and Lacker criterion, namely the root of AVE > correlation between variables.

In the high order structural equation model, evaluation is carried out in stages, namely at the dimension level and the variable level. At the dimension level, the results of the outer model test show that all measurement indicators are valid. This can be seen in Table 1, where all outer loading values are above 0.7.

Table 1: Outer loading dimension level

Indicator	Outer Loading	Information	Indicator	Outer Loading	Information
GEOI1←GEOI	0.560	Valid	GSC8 ← GSC	0.549	Valid
GEOI4←GEOI	0.543	Valid	GSC9 ← GSC	0.547	Valid
GEOI5←GEOI	0.563	Valid	GSC10 ← GSC	0.549	Valid
GIOI1← GIOI	0.533	Valid	ENP1 ← ENP	0.523	Valid
GIOI2← GIOI	0.547	Valid	ENP2 ← ENP	0.582	Valid
GIOI4 ← GIOI	0.545	Valid	ENP3 ← ENP	0.517	Valid
GIOI5 ← GIOI	0.550	Valid	ENP4 ← ENP	0.585	Valid
GIOI6 ← GIOI	0.531	Valid	ENP5 ← ENP	0.551	Valid
GIOI7 ← GIOI	0.516	Valid	ESP1 ← ESP	0.513	Valid
GIOI8 ← GIOI	0.532	Valid	ESP3 ← ESP	0.529	Valid
GHC1 ← GHC	0.563	Valid	ESP4 ← ESP	0.571	Valid
GHC2 ← GHC	0.547	Valid	ESP5 ← ESP	0.566	Valid
GHC3 ← GHC	0.542	Valid	ESP6 ← ESP	0.522	Valid
GHC4 ← GHC	0.590	Valid	FSP1 ← FSP	0.524	Valid
GHC5←GHC	0.544	Valid	FSP2 ← FSP	0.564	Valid
GHC6←GHC	0.553	Valid	FSP3 ← FSP	0.553	Valid
GRC1← GRC	0.533	Valid	FSP4 ← FSP	0.555	Valid
GRC2← GRC	0.544	Valid	FSP5 ← FSP	0.569	Valid
GRC3← GRC	0.524	Valid	FSP6 ← 3FSP	0.544	Valid
GRC4← GRC	0.534	Valid	SSP1 ← SSP	0.584	Valid
GRC6← GRC	0.525	Valid	SSP2 ← SSP	0.555	Valid

GRC7← GRC	0.576	Valid	SSP3 ← SSP	0.558	Valid
GRC8← GRC	0.536	Valid	SSP4 ← SSP	0.576	Valid
GSC1 ← GSC	0.553	Valid	SSP7 ← SSP	0.562	Valid
GSC2 ← GSC	0.552	Valid	TSP1 ← TSP	0.596	Valid
GSC3 ← GSC	0.531	Valid	TSP2 ← TSP	0.551	Valid
GSC4 ← GSC	0.575	Valid	TSP3 ← TSP	0.553	Valid
GSC6 ← GSC	0.528	Valid	TSP4 ← TSP	0.556	Valid
GSC7 ← GSC	0.544	Valid			

Based on Table 2, the reliability test uses Cronbach's Alpha (CA) and CR values. The CA value is reliable if its value is above 0.7. Based on Table 2, all CA values are above 0.7, indicating that all are reliable. Consequently, the CR value is said to be reliable if its value is above 0.7. Table 2 also lists that all CR values are above 0.7. The AVE value is above 0.5, meaning convergent validity is also met.

After the outer model test at the dimension level has been carried out and produces valid and reliable measurement indicators, the outer model measurement at the variable level is continued. Evaluating the variable level measurement model means looking at the causality between variables and the dimensions/ measurement items that measure them. Based on Table 3, the GOI variable is measured by two

Table 2: Reliability test dimension level

Dimensions	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
Dimensions of Green Internal Organisational Identity (GIOI)	0.718	0.718	0.842	0.640
Dimensions of Green External Organisational Identity (GEOI)	0.887	0.888	0.912	0.597
Dimensions of Green Human Capital (GHC)	0.888	0.889	0.915	0.642
Dimensions of Green Relational Capital (GRC)	0.890	0.890	0.914	0.603
Dimensions of Green Structural Capital (GSC)	0.924	0.924	0.937	0.622
Dimensions of Economic Performance (ENP)	0.854	0.856	0.896	0.633
Environment Performance Dimensions (ESP)	0.837	0.842	0.885	0.606
Dimensions of Financial Performance (FSP)	0.883	0.883	0.911	0.631
Social Performance Dimensions (SSP)	0.875	0.876	0.909	0.667
Task Performance Dimensions (TSP)	0.828	0.829	0.886	0.660

Source: SmartPLS Output (2024)

Table 3: Outer model variable levels

Variables	Dimensions	Outer Loading	Information
Green Intellectual Capital	GIC → GHC	0.906	Valid
	GIC → GRC	0.907	Valid
	GIC → GSC	0.941	Valid
Green Organisational Identity	GOI → GEOI	0.852	Valid
	GOI → GIOI	0.976	Valid
Green Innovation	GI1 ← GI	0.802	Valid
	GI2 ← GI	0.837	Valid
	GI3 ← GI	0.816	Valid
	GI4 ← GI	0.807	Valid
	GI5 ← GI	0.799	Valid
	GI6 ← GI	0.798	Valid
	GI7 ← GI	0.798	Valid
	GI8 ← GI	0.790	Valid
	GI9 ← GI	0.782	Valid
	GI10 ← GI	0.799	Valid
Sustainability Performance	SP → ENP	0.798	Valid
	SP → ESP	0.878	Valid
	SP → FSP	0.906	Valid
	SP → SSP	0.884	Valid
	SP → TSP	0.864	Valid

Source: SmartPLS Output (2024)

dimensions, namely GEOI and GIOI, where the outer loading value is between 0.852 and 0.976, where overall, the two dimensions are strongly correlated, reflecting the measurement of GOI. However, the highest outer loading is GIOI, with an outer loading of 0.976.

The GIC variable is measured by three GHC, GRC, and GSC dimensions, where the outer loading value lies between 0.906 and 0.941. The three dimensions are strongly correlated, reflecting the measurement of GIC. However, the highest outer loading is GSC, with an outer loading of 0.941. The GI variable is measured by 10 indicators, where the outer loading value lies between 0.790 and 0.837. Overall, the three dimensions are strongly correlated, reflecting the measurement of GI. Nonetheless, the highest outer loading is GI1, GI2, GI3, and GI4. Based on Table 3, the Sustainability Performance variable is measured by five dimensions, namely ENP, ESP, FSP, SSP, and TSP, where the outer loading value lies between 0.798 - 0.906. Overall, the five dimensions are strongly correlated, reflecting the measurement of Sustainability Performance. However, the highest outer loading is FSP, with an outer loading of 0.906.

Table 4: Reliability test variable level

Variables	Cronbach's Alpha	Composite Reliability (rho_a)	Composite Reliability (rho_c)	Information
GIC	0.957	0.957	0.942	Reliable
GOI	0.904	0.905	0.912	Reliable
GI	0.939	0.939	0.948	Reliable
SP	0.954	0.956	0.938	Reliable

Source: SmartPLS Output (2024)

Table 5: Convergent validity variable level

Variables	Average Variance Extracted (AVE)
GIC	0.843
GOI	0.839
GI	0.644
SP	0.751

Source: SmartPLS Output (2024)

Furthermore, the reliability test variabel level also uses Cronbach's Alpha (CA) and CR values. The CA value is reliable if its value is above 0.7. Based on Table 4, all CA values are above 0.7, indicating that all are reliable. Consequently, the CR value is said to be reliable if its value is above 0.7. Table also lists that all CR values are above 0.7. The AVE value is above 0.5, meaning convergent validity is also met. Table 5 shows the level of convergent validity with AVE for the four variables above is 0.50. Convergent validity describes how far all measurement items are strongly correlated in measuring their variables. In addition, convergent validity is the magnitude of the variation of items contained in the variable with the AVE measure. The evaluation results show that all AVE values of the variables are above 0.50, which means that convergent validity is met. The GIC variable has an AVE of 0.843, meaning that the variation of the GHC, GRC, and GSC dimensions contained in the GIC variable is 84.3%, exceeding the expected minimum value of 50%. Likewise, other variables, GOI, GI, and SP have an AVE above 0.50, indicating that the variation of the dimensions contained in the variables exceeds 50%. Convergent validity for each research variable is met, indicating that the outer model's evaluation is met.

Table 6: Fornell Lacker

	GI	GIC	GOI	SP
GI	0.803			
GIC	0.750	0.918		
GOI	0.635	0.722	0.916	
SP	0.794	0.845	0.706	0.867

Source: SmartPLS Output (2024)

The Fornell and Lacker criteria at the variable level are evaluations of discriminant validity at the variable level can be seen on Table 6. Namely, a variable has good discriminant validity if the AVE root of the variable is more significant than its correlation with other variables (J. Hair *et al*., 2021). Other than that, validity testing can be seen in the AVE and discriminant validity values. The AVE value in Table 4 presents that the AVE value is above 0.5, which indicates a valid indicator.

The inner model test will be performed by evaluating the structural model and then conducting a hypothesis test. Consequently, the third test will test the significance of the mediating variables and the fourth test will evaluate the influence of variables at the structural level with f-square. Based on processing the inner Variance Inflated Factor (VIF) value in Table 7. These results indicate that the estimated PLS parameters produced are acceptable. The estimated PLS model parameters are unbiased and can be used to determine the influence between variables.

Table 7: Inner VIF test

Influence	VIF
GI → SP	2.155
GIC → GI	1.963
GIC → SP	2.573
GOI → GI	1.963
GOI → SP	2.101

Source: SmartPLS Output (2024)

After the multicollinearity test, significance testing is continued. Since the model uses intervening variables, significance testing is conducted to test the direct and indirect effects in Table 8.

Figure 2 and Table 8 show the results of the structural model significance test. From the figure and table, the direct effect of green intellectual capital is more dominant on sustainability performance (0.494), compared to green organisational identity (0.135), and the influence of green innovation (0.337). At the structural level, the influence of green intellectual capital on sustainability performance is high while the influence of green innovation on sustainability performance is moderate and the influence of green organisational identity on sustainability performance is low although significant. Likewise, the influence of green intellectual capital on green innovation is also more dominant (0.610), compared to the influence of green organisational identity. Acceleration of green organisational identity is needed to improve green innovation and sustainability performance. The results of the mediation test show that the role of green innovation is very important/significant.

Based on the RBT, competitive advantage can be achieved if a company utilises environmental resources and intangible asset capabilities such as intellectual capital (Fahy & Smithee, 1999). GIC is one of the environmentally friendly intangible assets that

Table 8: Significance testing

No.	Hypothesis	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T-stat	*p*-values	Information
H1	GIC → SP	0.494	0.506	0.104	4.742	0.000	Significant
H2	GOI → SP	0.135	0.140	0.059	2.286	0.022	Significant
H3	GI → SP	0.337	0.321	0.119	2.825	0.005	Significant
H4	GIC → GI	0.610	0.608	0.074	8.266	0.000	Significant
H5	GOI → GI	0.194	0.198	0.079	2.445	0.015	Significant
H6	GIC → GI → SP	0.206	0.194	0.073	2.835	0.005	Significant
H7	GOI → GI → SP	0.066	0.061	0.031	2.134	0.033	Significant

Source: SmartPLS Output (2024)

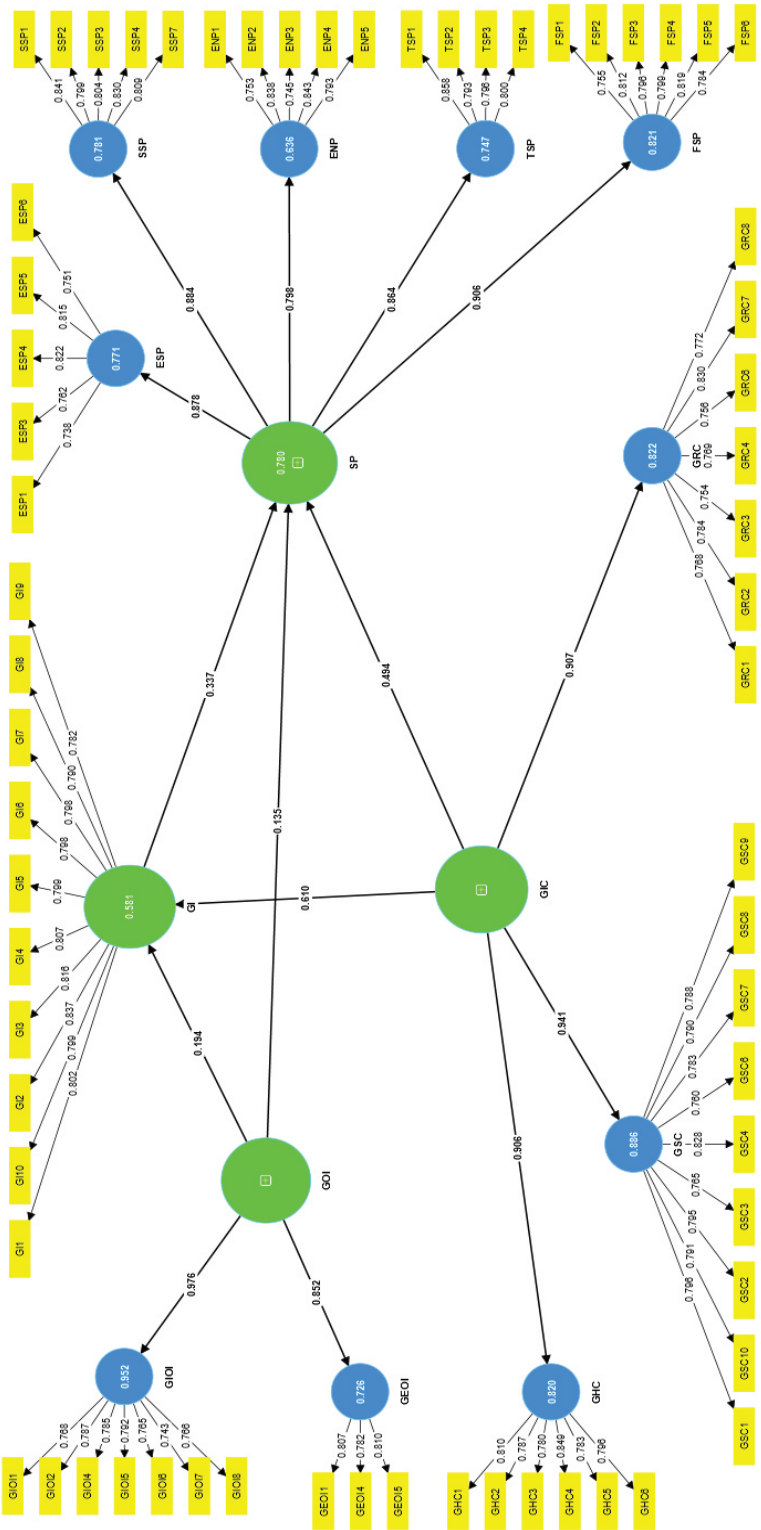

Figure 2: Outer loading and path coefficient

can lead a company to achieve SP. Barney *et al*. (2021) stated that a company's intangible resources are more likely to contribute to the achievement and sustainability of superior company performance when combined or integrated. Therefore, GIC and GOI are essential to achieve SP in SOE. The results of the first hypothesis test show that GIC has a significant and positive effect on SP. Moreover, the results of this study are in line with the research of Rizvi (2021), Khan *et al*. (2020), Awwad Al-Shammari *et al*. (2022), Boso *et al*. (2022), Yusliza *et al*. (2020), Zalfa and Novita (2021), T. Widyastuti *et al*. (2021), Firmansyah (2017), Yusoff *et al*. (2019), and Thiagarajan *et al*. (2017).

Based on the explanation of RBT, GOI is an intangible asset that can be utilised to direct companies to achieve SP. Thus, environmental problems can be solved by having an organisational identity, which is the primary value (Albert & Whetten, 1985). An environmentally oriented corporate identity must be built and understood together so that the company's vision, mission, and policies mutually benefit the company, the environment, and society. The results of the second hypothesis test show that GOI significantly and positively affects sustainability performance. The results of this study are in line with the research of C. H. Chang and Chen (2013), Xing *et al*. (2019), Zehir and Ozgul (2020), and Suraporn and Chalermporn (2021). These findings prove that the implementation of GOI in SOEs is believed to improve its sustainability performance.

The green identity of SOEs in this study can be internal (GIOI) and external (GEOI). GIOI, owned by SOEs, is the core value of AKHLAK. It encourages companies and their members to have the characteristics of Trustworthy, Competent, Harmonious, Loyal, Adaptive, and Collaborative about environmental sustainability to realise SP. The informant of the Ministry of SOEs stated that AKHLAK is the identity of all SOEs, subsidiaries, and grandchildren of companies that obey and must consider their environment as one of the Shareholder Aspirations (APS) always includes elements of environmental sustainability (green) in every company activity.

After research and development are conducted, the research results will be applied in the company's operations as a form of environmentally friendly innovation. Based on existing provisions, SOEs are given targets to achieve business model innovation and technological leadership related to GI. Various innovations are carried out by SOEs to achieve SP such as using renewable energy, business digitalisation, and several other innovations that impact company performance and the environment. According to the Triple Bottom Line (TBL) concept conveyed by Elkington (1998), the company's goals are divided into people, profit, and planet. Environmentally aware innovation is one way to achieve these goals.

According to Parcellia (2023), sustainability goals must apply the triple bottom line concept where investment in technology and sustainability practices can achieve these goals. In line with the opinions of Parcellia (2023) and Qi and Yang (2023), they also argue that adopting environmentally friendly technology is essential for sustainable growth. Based on the results of data analysis, respondents' answers show that the third hypothesis is accepted, namely that GI significantly affects sustainability performance. The results of this study are in line with the research of Asadi *et al*. (2020b) and Elzek *et al*. (2021) and different from the research conducted by Fitriani (2015) and Tay and Sundiman (2021). The study's results confirm the existing theory that to achieve sustainability goals that align with TBL theory, companies must be willing to invest in environmentally friendly innovations, either in producing sustainable technologies or practices.

GIC is a resource controlled by the company, which includes intangible assets, knowledge, capabilities, and other things related to environmental protection that are utilised to achieve sustainability goals (Y. S. Chen, 2008). By RBT, companies must be able to control knowledge/learning or rely on intangible

assets to achieve competitive advantage. According to Delgado-Verde *et al*. (2014), GIC is an intangible asset or knowledge related to environmental management and organisational ideas and an intermediary in an environmentally friendly product innovation. It presents that environmentally friendly product innovation will be achieved by developing GIC.

Other than that, it aligns with the opinion of Firmansyah (2017), who stated that GIC is a source of innovation. The results of the data analysis showed that the fourth hypothesis was accepted, namely that GIC has a significant and positive effect on GI. The increase in GIC will encourage the creation of GI in SOE. Hence, development is needed regarding GHC, structural capital, and relational capital to produce GI.

Company members create a GOI to give importance to behaviour regarding environmental protection and management. GI and developing environmentally friendly strategies require company member behaviour, which becomes a core value. GOI supports the development of GI strategies and green process improvements by combining various expertise and areas of expertise within the company to stimulate innovation that emphasises pollution and waste reduction, environmental system management, and implementing environmentally friendly products and practices (Chang *et al*., 2019).

Companies need to integrate all resources in organisational management and employee behaviour to focus on environmental issues. The unity of the relationship will be strengthened through GOI (Song & Yu, 2018). When a company has a more robust GOI, it will be able to obtain more resources and support from external and internal stakeholders (GIOI and GEOI) so that it will be easy to create GI (Xing *et al*., 2019). The study results indicate that the fifth hypothesis is accepted: GOI significantly affects GI. The results of this study are in line with the research of Chang and Chen (2013), Mushtaq *et al*. (2019), Soewarno *et al*. (2019), and Yousaf *et al*. (2022).

This study investigates the influence of GOI and intellectual capital on sustainability performance. In addition, this study places GI as a mediating variable in testing the influence of GOI and intellectual capital variables on SP. GI is a production process that uses environmentally friendly technology to produce goods and services that will reduce negative environmental impacts (Wong *et al*., 2012). With environmentally friendly technology, the company's performance will continue to grow while maintaining environmental sustainability. When a company uses green technology, the materials used will be selected to be environmentally friendly, material efficiency will occur, production costs will decrease, environmental impacts will be reduced, carbon emissions will be reduced, and other benefits will be good for society, the company and the environment. GI is currently essential to increase added value for the company. GI will result in the sustainability of all resources for the next generation (Y. S. Chen *et al*., 2006).

Note that GI is one way to achieve the company's strategic targets with techniques, systems, and practices to reduce the impact of environmental damage (Dewi & Rahmianingsih, 2020). GI requires support from GIC and organisational identity so that environmentally friendly innovation can continue to increase. With GI, sustainability performance will be achieved. As explained above, GI is one of the KPIs of SOEs to achieve sustainability goals.

As a state-owned company, SOEs are also expected to generate state revenue, achieve Net Zero Emission (NZE), preserve the environment, support community welfare, and provide public goods to achieve equitable development. It is by the mandate of the SOEs Law. Based on the explanation from the Deputy for Infrastructure Services, each State-Owned Enterprise is given a performance target related to environmentally friendly innovation and technology. It is based on the roadmap of the Ministry of SOE. In addition, each state-owned enterprise is asked to prepare a roadmap for innovation and technology that supports environmental sustainability. The

explanation from the Ministry of SOEs is from the informant at the SOE.

Given the importance of innovation in achieving corporate goals, PT ASDP has prepared an innovation and technology roadmap. PT ASDP has also provided a particular budget to support GI. Likewise, PTPP is more advanced in innovation in its business processes. Preparation of roadmaps, digitalisation of business processes, use of environmentally friendly technology, use of renewable energy, and other innovations have been carried out to achieve sustainability goals. PT Pertamina also does the same in achieving the technological and innovation leadership target. They have created a roadmap related to technology and innovation that focuses on efforts to produce environmentally friendly energy. Pertamina has launched a roadmap towards net zero emissions through decarbonisation and creating new energy and low-carbon businesses. It is an environmentally friendly innovation breakthrough that Pertamina is carrying out.

The use of environmentally friendly innovation is expected to achieve sustainability goals. Environmentally friendly technology or methods will create added value for the company. Informants from PTPP stated, "When compared to conventional, we focus more on working on green buildings. We have experience making green buildings, which is one of PTPP's advantages. It is an added value in the tender. Green buildings, in terms of life cycle are more efficient even though the investment is more expensive. That is one of the advantages. It has a superior impact and green for PTPP is more profitable". In addition, with GI, environmental preservation can be achieved by reducing emissions, reducing waste, and avoiding environmental damage. GI can also save costs such as reducing rework and saving materials, impacting costs by making them more economical. Financially, GI will increase profits with minimal costs. For the government and society, GI will make assignment projects faster to complete, save state finances, and certainly be of higher quality to encourage community welfare.

The study results indicate that GI successfully became a mediator in the relationship between the influence of GIC on sustainability performance. This result aligns with the research results by Marco-Lajara *et al*. (2022) and Asiaei *et al*. (2023). Likewise, this study presents that GI successfully became a mediator in the relationship between the influence of GOI on sustainability performance. This result is in line with research by Xing *et al*. (2019), Zehir and Ozgul (2020) and Fatoki (2021).

The results of the analysis show that hypotheses six and seven are proven. The vital role of GI as a mediating variable will be seen if it can help independent variables that have no significant influence on sustainability performance to have a significant influence when mediated by GI. In this study, according to the Table above, the analysis results show that GI plays a significant role as a mediating variable, namely, a variable that mediates the indirect influence of GIC on increasing SP. GI plays a significant role as a mediating variable. This variable mediates the indirect influence of GOI on increasing SP. However, because GIC and GOI also directly affect SP, the mediating effect of GI is included in partial mediation.

Conclusions

This study examines the influence of GIC and organisational identity on sustainability performance with GI as an intervening variable. This study proves that GIC positively impacts the sustainability performance of SOE. On the other hand, GOI has been proven to provide positive support for the sustainability performance of SOE. GI has been proven to contribute positively to the sustainability performance of SOE. Consequently, GIC has been proven to play an essential and positive role in increasing the GI of SOE. This study proves that GOI provides positive support for the GI of SOE. GI can mediate the relationship between GIC and GOI on SP. This study has limitations the author must work on during the research, especially data availability.

This study supports the RBT, which, among other things, emphasises intangible assets to improve the sustainability performance of companies, in this case, SOE. Hence, increasing intellectual capital and implementing a GOI have improved GI and SP. To improve the performance of SOE, SOEs and related stakeholders such as the Ministry of Finance and the Ministry of SOEs need to be able to formulate policies to improve GIC, GOI, and GI. The results of this study are expected to be helpful for the Ministry of Finance and the Ministry of SOE.

This study contributes to the natural resource-based view literature by responding to the recent trend of examining the combined effects of resources on sustainability performance. This study also has important implications for management practice as it illustrates the potential of green competitive advantage to enhance sustainability performance. Strategically, it is important for managers to promote green ideas such as sustainable environmental management, GI and low-cost and differentiation strategies, which in turn contribute to sustainability performance.

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Conflict of Interest Statement

The authors declare that they have no conflict of interest.

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