

Green competitive advantage: Examining the role of environmental consciousness and green intellectual capital

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ABSTRACT

The purpose of this study was to examine the role of environmental consciousness and green intellectual capital (GIC) for green competitive advantage. The association between environmental consciousness and each component of GIC—green human capital, green relational capital, green structural capital—is tested in this study. Tests are also carried out to examine the association of each GIC element with green competitive advantage. Data were collected using an online questionnaire. A total of 237 questionnaires were sent to the CEOs of medium manufacturing companies in Bali Province, Indonesia. There were 72 returned questionnaires that could be analyzed (a 30.37% usable response rate). Data analysis was performed using variance-based structural equation modelling with the partial least square (SEM-PLS) approach with WarpPLS 7.0. The findings show that there is a positive and significant association between environmental consciousness and each component of GIC: environmental consciousness with green human capital, environmental consciousness with green relational capital and environmental consciousness with green structural capital. The findings also demonstrate that each component of GIC has a significant positive association with green competitive advantage: green human capital with green competitive advantage, green relational capital with green competitive advantage and green structural capital with green competitive advantage. This research implies that going green through the adoption of green practices can contribute to green competitive advantage.

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1. Introduction

The emergence of various regulations regarding the environment makes environmental issues cannot be underestimated, especially for companies that have the potential to threaten environmental sustainability. Companies in the manufacturing industry face high green pressure as non-compliance with environmental regulations has many negative impacts (Sharma & Henriques, 2005). Therefore, companies in the industry are expected to be more proactive with environmental issues and have a high commitment to sustainability strategies (Buyse & Verbeke, 2003; C. L. Huang & Kung, 2010). A proactive strategy to deal with the impacts of the emerging environmental era must be adopted (Haden et al., 2009). Organisations have no choice but to undertake green management to comply with environmental forces (Berry & Rondinelli, 1998). Despite trade-offs between environmental protection activities and traditional organisational benefits, conflicts between environmental management and organisational performance can be resolved with green competitive advantage (Chen & Chang, 2013). According to Lin and Chen (2016), green competitive advantage is an important factor for organisations to increase the achievement of sustainable development. The application of the concept of sustainable development in the manufacturing industry emphasizes the need for strategical thinking regarding environmental problems. In a knowledge-based economy, competitive advantage is driven by intangible assets, known as intellectual capital (IC) (Chaudhry et al., 2016). IC is becoming more important than tangible resources in a knowledge-based economy (Allameh, 2018) and is a new approach to solving environmental problems (Omar et al., 2017).

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In line with the increasing trend of environmentalism, the concept of IC has developed following this trend which is marked by the emergence of the idea of green intellectual capital (GIC). The idea put forward by Chen (2008) includes green human capital, green relational capital and green structural capital. Organisations that carry out more activities related to the environment and green intangible assets can achieve green competitive advantage thanks to their commitment to environmental issues and investment in GIC (Chen & Chang, 2013). GIC can be improved by encouraging environmental consciousness (Chang & Chen, 2012), namely the overall perception of an organisation or individual regarding environmental concepts such as environmental protection, environmental policy, environmental management, environmentalism and so on (Ahmed et al., 1998). Huang and Kung, (2011) found that environmental consciousness has a direct impact on competitive advantage through GIC. Currently, the concept of GIC is not widely known by academics and practitioners (Yussof et al., 2019). Chang and Chen (2012) and Chaudhry et al. (2016) have started testing the impact of environmental consciousness on GIC, but similar research can hardly be found. Research that examines the role of GIC on green competitive advantage, as well as the literature that discusses green competitive advantage, can hardly be found. Although Chen (2008) has pioneered research examining the relationship between GIC and competitive advantage, the competitive advantage tested is not in the context of green (environmentally friendly). Based on the description above, this study was conducted to examine the role of environmental consciousness and GIC for green competitive advantage by testing (1) the association between environmental consciousness and each component of GIC—green human capital, green relational capital, green structural capital—and (2) the association of each GIC component with green competitive advantage. This research is the first attempt to build an empirical model of green competitive advantage through the role of environmental consciousness and GIC. This is a novelty in this research.

This study must be carried out urgently because: first, the emergence of regulations regarding the environment nationally and internationally and the emergence of consumer environmentalism cause the rules and patterns of business competition to be different in the environmental era (Dwyer, 2009). On the other hand, the academic community seems not yet concerned about the impact of strict environmental regulations and consumer environmentalism on competitive advantage (Chen & Chang, 2013). Second, there is no standard IC model. IC is contextual. In the context of the environmental era, IC leads to GIC. Currently, the green issue has become a universal concept (Chaudhry et al., 2016). Third, business from the perspective of sustainable development, apart from being responsible for its own interests, is also required to be responsible for the environment and society. This presents huge challenges and opportunities for businesses. Organisations that operate sustainably have a remarkable opportunity to improve their reputation and image, as well as their financial and environmental performance, to increase their competitive advantage (Longoni & Cagliano, 2015). Fourth, there is no integrated model that explains the role of environmental consciousness and GIC in achieving green competitive advantage.

2. Literature Review

2.1. *An overview of the natural-resources-based view and intellectual capital-based view*

Natural-resources-based view (NRBV) is an adaptation of a company's resource-based view (RBV) which is needed because of the demands of nature. NRBV complements the resource-based view (RBV) because according to Hart (1995), RBV ignores the relationship between the natural environment and organisation. As per Hart (1995), environmental resources and capabilities are needed to gain a competitive advantage in the present and future. Companies can have difficulties in acquiring new resources or capabilities if they are too attached to a particular set of resources. Therefore, the development of new resources is required in order for companies to be able to respond to changing environmental needs (Menguc & Ozanne, 2005). Hart (1995) argues that one of the most important drivers of new resources and capacity building for companies will be the constraints and challenges posed by the natural environment (biophysical). From the perspective of NRBV, in the future, it seems inevitable that business (markets) will be limited by and dependent on ecosystems (nature). There are three main capabilities in NRBV, namely pollution prevention, product stewardship and sustainable development. Each of these capabilities has different environmental driving forces, is built on different key resources and has different sources of competitive advantage (Hart & Dowell, 2011). Meanwhile, the intellectual capital-based view (ICV) is a middle-range theory that represents a special aspect of RBV which is more general in nature. Compared to RBV, ICV is more specific by considering three resources that are theoretically related to organisational competitive advantage. In particular, ICV is concerned only with the knowledge created by and stored in the three components of organisational capital, namely human capital, relational capital and structural capital. In ICV, Reed et al. (2006) defined competitive advantage related to resource characteristics that enable an organisation to outperform its competitors in the same industry. In line with Peteraf and Barney (2003), ICV attempts to avoid tautological problems by defining knowledge resources through their theoretical relationships with a competitive advantage and not through empirical financial relationships. This study links NRBV and ICV to conceptualise intangible resources that lead to competitive advantage by assimilating green into conventional IC, namely GIC, and into conventional competitive advantage, namely green competitive advantage.

2.2. *Environmental consciousness, GIC, green competitive advantage*

Environmental consciousness refers to all views of individuals and organisations regarding environmental safety, environmental control and green politics (Chaudhry et al., 2016). The environmental consciousness of business organisations can help improve and improve organisational green management in accordance with environmental requirements and regulations (Qassim, 1994). Environmental consciousness will also influence green innovation and organisational business operations (Schlegelmilch et al., 1996). Ahmed et al. (1998) and Naffziger et al. (2003) found a positive relationship between environmental consciousness and organisational performance, especially in the environmental era. Chen (2011) concluded that if an

organisation focuses on providing environmental culture and handles environmental issues well, it will gain a competitive advantage. Chen (2008) argues that investment in IC related to environmental protection—known as GIC—is not only for the purpose of meeting environmental management but also for competitive advantage. Chen (2008) defines GIC as the total stock of all types of intangible assets, knowledge, abilities, relationships and so on regarding environmental protection or green innovation, both at the individual and organisational levels in an organisation. GIC is classified into the following:

1) Green human capital, which is the sum of knowledge, skills, abilities, experience, attitudes, wisdom, creativity and employee commitment and so on regarding environmental protection or green innovation (Chen, 2008). There are two aspects of green human capital, namely environmental competence and commitment to activities (Huang & Kung, 2011). Knowledge, skills, abilities, experience, attitudes, wisdom, creativity and communication skills should be owned in order for organisational resources to deal with environmental problems (Klein & Prusak, 1994). Employee environmental competence can be improved in various ways; for example, by developing leadership, providing training, managing talent and involving employees (Wirtenberg et al., 2007). The long-term perspective and the existence of strong social and environmental consciousness of all company leaders, supported by high-level managers, as well as an encouragement for employees to act, must be the basis for decision-making and resource allocation so that aspects of commitment to activities are realised (Huang & Kung, 2011).

2) Green relational capital, which is an interactive relationship between organisations and customers, suppliers, network members and partners regarding organisational environmental management and green innovation (C.-L. Huang & Kung, 2011). In order to survive and develop, companies must gain support and resources from external agencies and major stakeholders. In the era of environmentalism, many of these institutions and stakeholders pay attention to environmental problems. Therefore, investing in resources to develop relationships associated with shared environmental interests is important for companies to be able to establish good relationships with both parties (Chang & Chen, 2012). Huang and Kung (2011) suggest that increasing expenditure on environmentally friendly products or services reflects having a strong commitment to customer loyalty and satisfaction to increase sales. In this prominent green trend, companies are also required to ensure supplier performance in relation to the quality of environmentally friendly products and services offered and maintain healthy interactions with suppliers. As a result, the number and value of supplier alliances can increase (Huang & Kung, 2011).

3) Green structural capital, namely organisational capabilities, organisational commitment, knowledge management systems, managerial philosophy, organisational culture, image, patents, copyrights, trademarks and so on regarding environmental protection or green innovation in organisations (Chen, 2008). Huang and Kung (2011) suggest that this capital refers to specifications, empowerment and supporting infrastructure that are related to environmental protection or sustainability strategies. The design and implementation of a good environmental management system will avoid unnecessary waste of energy and materials and increase productivity. Companies can also establish a positive reputation and set premium prices for their manufactured products (Berry & Rondinelli, 1998; Porter & Linde, 1995).

Green competitive advantage is a condition in which organisations occupy several positions regarding environmental protection or green innovation, and competitors cannot imitate a successful environmental strategy, thus resulting in the organisation obtaining sustainable benefits from this environmental strategy (Chen & Chang, 2013). Organisations that pioneer environmental innovation can gain a competitive advantage, enable the sale of their environmental technology or services to improve a company's image and create new markets (Chen et al., 2006).

2.3. Hypotheses formulation

2.3.1. Environmental consciousness and GIC

Environmental consciousness is one of the best types of corporate culture that plays an important role in the successful implementation of green management (Chang & Chen, 2012). Individuals and organisational management with high environmental consciousness will have the skills, abilities, knowledge, creativity and good attitude to handle environmental problems appropriately (Huang & Kung, 2011). In addition, it also has the right information about market networks and strong relationships with external parties and is able to protect the environment by providing a supportive corporate infrastructure in order to obtain a competitive advantage. Environmental consciousness will encourage companies to develop business according to stakeholders' interests, be more aggressive in expanding environmental strategies and put a significant amount of resources into GIC (Huang & Kung, 2011). Chang and Chen (2012) suggest that the emergence of environmental trends has motivated organisations to equip employees with the ability to make products in accordance with environmental regulations. High environmental consciousness will encourage organisations to provide an understanding of environmental policies for employees and strive to improve employee competencies related to environmental management and green innovation. Ferrell et al. (1997) found a positive relationship between employees' perceptions of the environment and their proactive environmental behaviour. Similar results are shown by Chang and Chen (2012) who found that environmental consciousness is positively related to green human capital. Environmental concern for stakeholders (such as community groups, customers, employees, suppliers, partners, local communities) will emerge from companies with high environmental consciousness (Chang & Chen, 2012). Customer purchasing decisions are influenced by customer environmentalism. Therefore, the company must care about the environment for its customers in order to maintain and improve relationships with them (Schlegelmilch et al., 1996). Chang and Chen (2012) found that there is a positive relationship between environmental consciousness and green relational capital. Greeno and Robinson (1992) suggest that by adopting a proactive environmental management strategy, companies can inte-

grate environmental protection objectives among various departments to solve environmental problems by employing innovative environmental technologies. Environmental pollution can be minimised by redesigning the production process and increasing the green productivity of the organisation (Porter & Linde, 1995). The high level of environmental consciousness will increase the company's ability to innovate in technology related to the environment and business operations (Greeno & Robinson, 1992; Schlegelmilch et al., 1996). This is supported by the results of research by Chang and Chen (2012) which show that environmental consciousness is positively related to green structural capital.

Based on the description above, the following hypotheses are formulated:

H1: Environmental consciousness is positively associated with green human capital.

H2: Environmental consciousness is positively associated with green relational capital.

H3: Environmental consciousness is positively associated with green structural capital.

2.3.2. *GIC and green competitive advantage*

IC is an intangible owned by an organisation and contributes to value creation through competitive advantage (Astuti et al., 2019). The popularity of environmentalism makes GIC an important managerial agenda for business organisations. According to Chaudhry et al. (2016), GIC will differentiate the company from its competitors. GIC is the company's uniqueness that allows it to gain a competitive advantage. Chen (2008) found that company competitiveness will be strong when the IC is strong. In the NRBV view, strategy and competitive advantage are rooted in organisational capabilities that can facilitate environmentally sustainable economic activity (Hart, 1995). Therefore, investing in GIC—green human capital, green relational capital, green structural capital—, will significantly assist in obtaining a competitive advantage. The GIC that is successfully established by the company will become a separate obstacle for competitors so that the organisation can secure its position in the market, which in turn can maintain a competitive advantage (Chaudhry et al., 2016).

In the environmental era, in order to adopt environmental strategies, companies must have environmental knowledge. In this era, the company's competitive advantage could be obtained from green human capital. Environmental knowledge inherent in individuals plays an important role for companies, especially in developing green innovation and green management, in order to meet external environmental pressures (Chang & Chen, 2012). Chen (2008) found a significant positive relationship between green human capital and competitive advantage. However, Rezaei et al. (2016) found that this positive relationship was not significant. Environmental knowledge can also take the form of a company's stock of interactive relationships with stakeholders, such as customers, suppliers, network members and partners, regarding environmental management and green innovation, which is known as green relational capital. In line with environmental trends, environmental issues are of concern to many parties, including external parties and stakeholders. It is important for companies to invest in resources that can develop relationships associated with shared environmental interests (Chang & Chen, 2012). Good relationships, particularly those related to environmental management and green innovation, encourage support and resources from stakeholders, thus helping companies to gain a competitive advantage. Chen (2008) found a significant positive relationship between green relational capital and competitive advantage, whereas Rezaei et al. (2016) found a positive relationship that was not significant. Previous research has found that structural capital has a significant positive relationship with a competitive advantage (Altarawneh, 2017; Astuti et al., 2019; Chen, 2008; Rezaei et al., 2016; Yaseen et al., 2016). A company's competitive advantage can be obtained from the stock of organisational capabilities, organisational commitment, knowledge management systems, reward systems, information technology systems, databases, managerial institutions, operating processes, managerial philosophy, organisational culture, corporate image, patents, copyrights and trademarks among others that are related to environmental protection or green innovation (Chen, 2008). Green structural capital appears when environmental knowledge is codified into routine, activity rules and procedures so that tacit knowledge turns into a systematic one that can be used, applied and shared. In the environmental era, companies that are concerned and willing to invest in overcoming environmental problems and make green innovations will avoid the imposition of sanctions related to environmental protection, increased image and production efficiency and can develop new environmental markets to increase competitive advantage (Chen, 2008).

Based on the description above, the following hypotheses are formulated:

H4: Green human capital is positively associated with green competitive advantage.

H5: Green relational capital is positively associated with green competitive advantage.

H6: Green structural capital is positively associated with green competitive advantage.

3. Methodology

3.1. *Research setting and sample*

This study uses a sample from the medium manufacturing industry which is located in Bali Province. According to BPS-Statistics of Bali Province (2019), based on the number of workers, there are 382 companies classified as medium manufacturing industries (20 to 99 workers). The sample size is determined using the Slovin formula, thus assuming the sampling error is 5%, the sample size of this study is 178. We collected data from the CEOs of medium manufacturing companies, who represent companies as research respondents. Data was collected using an online questionnaire, which was created using the Google Forms application, because this research was conducted at the time of the Covid-19 pandemic when maintaining

distance was required and leaving the house was minimised. The questionnaire link is sent to the respondent via e-mail or WhatsApp. With the assumption of a response rate of 75%, the questionnaire sent to the respondent is 237. The questionnaire is accompanied by a cover letter that explains the research objectives and guarantees the confidentiality of the data. Two weeks after sending the questionnaires, we began receiving questionnaire responses from respondents. Of the 237 questionnaires sent, 72 were returned and filled in completely, providing a usable response rate of 30.37%. This low usable response rate is due to the fact that many manufacturing companies in Bali Province did not operate during the Covid-19 pandemic.

Based on the results of the non-response bias test against respondents who returned the questionnaire answers on time and too late, it shows that there is no problem in non-response bias. Demographic analysis of the respondents shows that most of the participants to this study were male (65%), had a service life of >5 years (96%) and had an undergraduate degree (81%).

3.2. Measurement

Measurement of questionnaire items in this study used a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Environmental consciousness is measured using four items adapted from Chang and Chen's (2012) research: (a) companies have clear and concrete environmental policies; (b) managers in the company are responsible for environmental policies; (c) employees in the company understand environmental policies and regulations; and (d) the company carries out regular environmental audits. Green human capital is measured using five items adapted from Huang and Kung's (2011) research: (a) employees in the company are involved in productivity and contribute positively to environmental protection; (b) company employees have adequate competence on environmental protection; (c) company employees provide high-quality services and products related to environmental protection; (d) the work team within the company has satisfactory cooperation related to environmental protection; and (e) managers in this company fully support employees in carrying out environmental protection duties. The measurement of green relational capital uses five items adapted from Huang and Kung's (2011) research: (a) the company designs its products or services according to the environmental demands of its customers; (b) customers are satisfied with the company's environmental protection; (c) the company's cooperative relationship with upstream suppliers on environmental protection is stable; (d) the company's cooperative relationship with clients or its downstream channels on environmental protection is stable; and (e) the company has a stable and favourable cooperative relationship regarding environmental protection with its strategic partners.

Green structural capital is measured using eight items adopted from Huang and Kung (2011): (a) the company has a superior environmental protection management system; (b) the company has set up a team to deal with environmental protection issues; (c) the company has established detailed environmental protection rules and regulations; (d) the company makes an adequate investment in environmental protection facilities; (e) the ratio of employees who handle environmental management to total company employees is high; (f) the entire operational process regarding environmental protection in the company runs smoothly; (g) the company's knowledge management system supports the accumulation and sharing of knowledge related to environmental management; and (h) the company has established a reward system for completing environmental tasks. Meanwhile, green competitive advantage is measured using ten items adapted from Chen and Chang's (2013) study, namely that compared to its main competitors, the company: (a) has a low-cost competitive advantage regarding environmental protection or green innovation; (b) offers better quality of environmentally friendly products or services; (c) is more able to do R&D on environmental protection or green innovation; (d) has better environmental managerial skills; (e) has better profitability; (f) marks deeper growth in environmentally friendly products or services; (g) is the first mover in several important areas of environmentally friendly products or services and occupies several important positions; (h) has a better environmental image; (i) has a major competitor who cannot easily replicate the its eco-friendly products or services and/or environmental ideas; and (j) has major competitors who cannot easily replace its distinctive position on environmental management or green innovation. The results of descriptive statistics (Table 1) show that there is no far range from the respondent's answer. The items that are asked about are answered by the respondent with the agreed answer which is shown by the mean value of 4.13 (green human capital), 4.12 (green structural capital) and 4.17 (green competitive advantage). Meanwhile, the mean value for environmental consciousness (3.95) and green relational capital (3.74) shows a value close to 4.00. Therefore, the respondents on average also agree with the items being asked.

Table 1

Descriptive statistics of variables studied

Variable	Theoretical Score		Actual Score		Mean	SD
	Min	Max	Min	Max		
EC	1.00	5.00	2.00	5.00	3.95	0.70
GHC	1.00	5.00	2.80	4.80	4.13	0.51
GRC	1.00	5.00	2.40	4.80	3.74	0.59
GSC	1.00	5.00	2.25	5.00	4.12	0.58
GCA	1.00	5.00	2.30	5.00	4.17	0.56

3.3. Data analysis

Variance-based structural equation modelling with the partial least square (SEM-PLS) approach with WarpsPLS 7.0 was used to test the hypothesis of this study. SEM-PLS is considered suitable for use because it: (1) can test several dependent and

independent variables simultaneously; (2) can handle a relatively small sample size; and (3) does not require the assumption of a normal distribution (see Hair et al., 2013).

4. Results/findings

4.1 Measurement model analysis

Reliability in this study was measured by composite reliability and Cronbach's alpha. Table 2 shows the value of composite reliability and Cronbach's alpha above 0.70 so that it meets the minimum requirements for reliability since both values must be above 0.70 as a condition of reliability (Fornell & Larcker, 1981; Nunnally, 1978).

Table 2

Reliability and convergent validity

	EC	GHC	GRC	GSC	GCA
Composite reliability	0.902	0.854	0.858	0.916	0.928
Cronbach's alpha	0.854	0.786	0.793	0.895	0.913
Average variance extracted	0.696	0.539	0.548	0.578	0.562

Convergent validity and discriminant validity are measures of the validity of the constructs in this study. Convergent validity is based on the average variance extracted (AVE) value and the loading of each indicator. Fornell and Lacker (1981) stated that the qualifying AVE value is if it is above 0.50. The AVE value in this study has met the requirements (see Table 2). The fulfilment of convergent validity in this study was also demonstrated in the results of combined loadings and cross-loadings (Table 3). Hair et al. (2013) stated that the convergent validity requirement for reflective constructs is that the outer loading must be above 0.70 and the p-value is significant (<0.05). Table 3 shows that the outer loading value in this study is above 0.70 and significant, except for the GCA7 indicator which has a loading of 0.70. According to Hair et al. (2013), indicators with loading from 0.40 to 0.70 should still be considered to be maintained, if removing indicators does not increase AVE and composite reliability above the limit. Based on this, the GCA7 indicator will be maintained. Thus, the convergent validity for the reflective construct in this study is fulfilled.

Table 3

Combined loadings and cross-loadings results

	EC	GHC	GRC	GSC	GCA	P value*
EC1	(0.796)	-0.039	-0.116	-0.051	-0.044	<0.001
EC2	(0.827)	-0.349	0.227	-0.006	0.166	<0.001
EC3	(0.869)	0.297	-0.155	-0.022	-0.062	<0.001
EC4	(0.844)	0.073	0.046	0.077	-0.058	<0.001
GHC1	-0.080	(0.704)	0.185	0.000	0.022	<0.001
GHC2	0.156	(0.729)	-0.497	-0.037	0.088	<0.001
GHC3	-0.121	(0.719)	0.145	-0.210	0.111	<0.001
GHC4	-0.071	(0.784)	-0.043	0.227	-0.231	<0.001
GHC5	0.116	(0.732)	0.221	0.000	0.029	<0.001
GRC1	0.244	-0.468	(0.713)	0.006	0.076	<0.001
GRC2	0.201	-0.194	(0.786)	-0.199	0.102	<0.001
GRC3	-0.310	0.535	(0.735)	0.216	-0.106	<0.001
GRC4	-0.005	0.179	(0.755)	-0.081	-0.109	<0.001
GRC5	-0.142	-0.059	(0.709)	0.077	0.036	<0.001
GSC1	-0.004	0.242	-0.169	(0.750)	0.142	<0.001
GSC2	0.185	0.260	-0.319	(0.732)	0.007	<0.001
GSC3	0.163	-0.354	0.202	(0.732)	0.129	<0.001
GSC4	-0.144	-0.196	0.267	(0.747)	-0.010	<0.001
GSC5	-0.071	-0.022	-0.051	(0.792)	0.155	<0.001
GSC6	0.072	-0.296	0.403	(0.738)	-0.112	<0.001
GSC7	-0.024	-0.136	0.095	(0.812)	-0.095	<0.001
GSC8	-0.157	0.489	-0.413	(0.776)	-0.208	<0.001
GCA1	-0.019	0.153	0.059	0.262	(0.738)	<0.001
GCA2	0.057	-0.041	0.125	-0.152	(0.709)	<0.001
GCA3	0.052	-0.005	0.032	-0.052	(0.749)	<0.001
GCA4	0.272	-0.485	0.202	-0.068	(0.741)	<0.001
GCA5					(0.803)	<0.001
GCA6					(0.799)	<0.001
GCA7					(0.700)	<0.001
GCA8					(0.749)	<0.001
GCA9					(0.735)	<0.001
GCA10					(0.766)	<0.001

*All significant at p<0.01

In order to meet the requirements of discriminant validity, the value of loading to other constructs (cross-loading) is expected to be lower than that of the construct. Table 3 shows the fulfilment of these requirements. The loading value of EC1 to the EC

construct (0.796) is greater than the value of its cross-loadings to other constructs (GHC, GRC, GSC, GCA). The same applies to the loading value of other indicators (bold and brackets) to other constructs.

4.2 Structural model analysis

The findings in the full model testing (Table 4, Fig. 1) show that there is a significant positive relationship between environmental consciousness and green human capital ($\beta=0.684$; $p<0.01$); green relational capital ($\beta=0.520$; $p<0.01$); and green structural capital ($\beta=0.291$; $p<0.01$). Based on these findings, the hypothesis H1 (environmental consciousness is positively associated with green human capital), H2 (environmental consciousness is positively associated with green relational capital) and H3 (environmental consciousness is positively associated with green structural capital) is supported.

Table 4

PLS results for full model

Variable	Path to			
	Green human capital	Green relational capital	Green structural capital	Green competitive advantage
Environmental consciousness	0.684 ($p<0.001$)*	0.520 (<0.001)*	0.291 ($p=0.004$)*	
Green human capital				0.763 ($p<0.001$)*
Green relational capital				0.374 ($p<0.001$)*
Green structural capital				0.311 ($p=0.002$)*
R-squared	0.468	0.270	0.085	0.669

*All significant at $p<0.01$

The hypothesis H4, which states that green human capital is positively associated with green competitive advantage, has been proven in this study by obtaining a significant positive relationship value ($\beta=0.763$; $p<0.01$). The full model test results also support the hypotheses H5 and H6 by obtaining a significant positive value of the relationship between green relational capital and green competitive advantage ($\beta=0.374$; $p<0.01$) and the relationship between green structural capital and green competitive advantage ($\beta=0.311$; $p<0.01$).

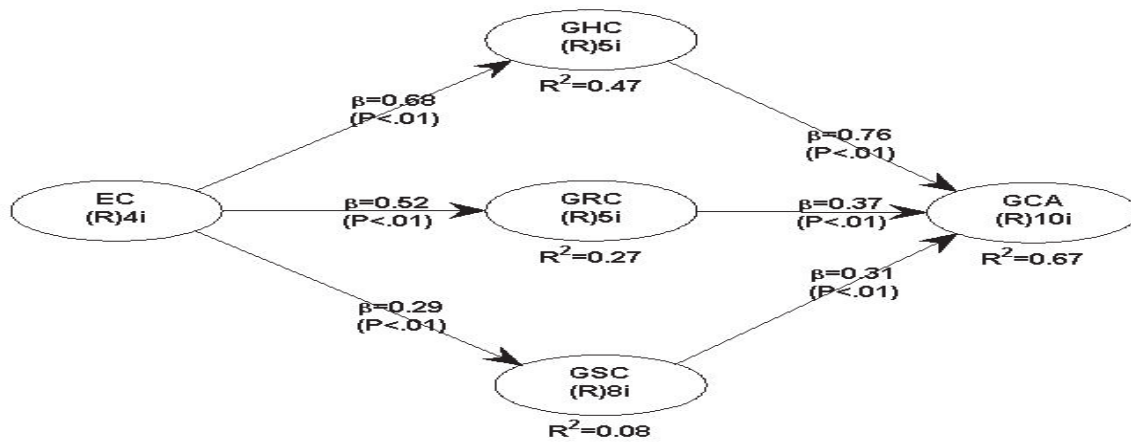


Fig. 1. PLS results

Table 5

Effect size test results

	EC	GHC	GRC	GSC	GCA
EC					
GHC	0.468				
GRC	0.270				
GSC	0.085				
GCA		0.413	0.120	0.135	

Reliable and valid outer model estimates allow the evaluation of the inner path model estimates. The coefficient of determination (R-squared of the endogenous latent variable) is an important criterion for assessing this. This value shows what percentage of the variance of endogenous latent variables can be explained by exogenous latent variables which are hypothesised to influence it. In the PLS path model, the R-squared value is 0.67; 0.33; or 0.19 for endogenous latent variables, described as substantial, moderate or weak (Chin, 1998). The R-squared value of the green competitive advantage of 0.669 (Table 4) indicates the fulfilment of the criteria for the R-squared value at a substantial level. Thus, the path model in this study is effective. This is in accordance with Henseler et al. (2009) who stated that if endogenous latent variables depend on some

exogenous latent variables, the R-squared value must show at least a substantial level. The practical significance and estimation of the extent to which the statistical findings in this study are in the population were carried out by conducting the effect size test, the results of which are shown in Table 5. The effect size value, which is 0.02; 0.15; and 0.35, can be used as a measure of whether the latent predictor variable has a weak, moderate or large effect at the structural level (Hair et al., 2013). The estimation results in Table 5 show the effect size of the effect of environmental consciousness on green human capital of 0.468 and green human capital on green competitive advantage of 0.413. These results are classified as a large effect size, showing that environmental consciousness has an important role from a practical perspective in increasing green human capital. Similarly, green human capital plays a significant role in increasing green competitive advantage.

5. Discussion

This research has succeeded in proving the existence of a relationship between environmental consciousness and GIC—green human capital, green relational capital, green structural capital—which in turn is related to the achievement of green competitive advantage. Environmental consciousness has a significant positive relationship with all three types of GIC. The support for the H1 hypothesis, which states that environmental consciousness is positively associated with green human capital, is in accordance with the findings (Chang & Chen, 2012). Companies in the medium-sized manufacturing industry in Bali Province have clear and concrete environmental policies which are understood by employees. Besides, managers are responsible for these policies. This allows employees to be involved in productivity, contribute positively and have adequate competence in environmental protection. Environmental policies that are understood by employees demonstrate employee competence, which enables them to contribute positively, be involved in productivity and provide high-quality services and products related to environmental protection. Giving responsibility to managers for environmental policies shows the full support of managers for employees to carry out environmental protection tasks. This support also leads to the creation of good cooperation from the work team related to environmental protection. The significant positive relationship between environmental consciousness and green relational capital means that a clear and concrete environmental policy in companies in the medium-sized manufacturing industry in Bali Province underlies the establishment of stable cooperative relationships with upstream suppliers, clients or downstream channels and strategic partners. This policy is also the basis for the company in designing products or services, which is supported by the results of periodic environmental audits. All of which provide customer satisfaction for the company's environmental protection. The findings of this study support Chang and Chen (2012) who found a significant positive relationship between environmental consciousness and green relational capital.

This study noted similar findings with Chang and Chen (2012), namely the existence of a significant positive relationship between environmental consciousness and green structural capital. Having a clear and concrete environmental policy and regular environmental audits by companies in the medium-sized manufacturing industry in Bali Province reflect that environmental protection rules and regulations are set out in detail and a sound environmental protection management system is established in order for all operational processes related to protection environment to work well. The knowledge management system in companies in the industry supports the accumulation and sharing of knowledge related to environmental management, which is shown by the provision of responsibility for environmental policies to managers and understanding of these policies and regulations by employees. These findings are in accordance with the arguments of Nidumolu et al. (2013) who state that environmental consciousness spurs changes in organisations and technology that will force companies to change the way they think about products, technology and processes.

A significant positive path in the relationship between green human capital and green competitive advantage shows that competent employees can support the achievement of profitability, the company's environmental image and the growth of environmentally friendly products or services, which are better than its main competitors. This is in accordance with Huang and Kung (2011) who state that companies that are committed to social and environmental responsibility will increase their environmental performance in view of establishing a good reputation in line with an increasing competitive advantage. According to Nivlouei and Khass (2014), when organisations train their employees, sharing green knowledge facilitates information exchange among them, which can provide a competitive environment. Employee competence related to environmental protection enables companies to be able to conduct research and development related to environmental protection or green innovation in order to offer better environmentally friendly products or services that are difficult to imitate by competitors.

These findings prove the arguments of Hitt et al. (2001) who state that companies with competent employees will get higher profits than their competitors, which in turn positively affects the results and the company's competitive advantage. Green human capital management helps in directing the attention and behaviour of employees to achieve the company's sustainability goals (Ramus & Steger, 2000). Research on the relationship between the environment and financial performance shows that the benefits of pollution prevention are more likely if the company has strong innovation capabilities, especially those related to continuous improvement (King & Lenox, 2002). Meanwhile, a pollution prevention strategy requires business organisations to develop new competencies (Hart & Dowell, 2011). The findings of this study support Chen (2008) who found a significant positive relationship between green human capital and competitive advantage. The hypothesis H5 which states that green relational capital is positively associated with green competitive advantage has been proven in this study. This finding is similar to Chen (2008). Stable cooperative relationships related to environmental protection with upstream suppliers, clients or downstream channels and strategic partners encourage low-cost competitive advantages in environmental protection or green innovation for companies in the medium-sized manufacturing industry in Bali Province. Companies can offer eco-

friendly products or services that are better than their competitors'. Customers who are satisfied with the company's environmental protection reflect that the company has good environmental managerial skills.

These findings support Nivlouei and Khas (2014) who state that increasing interactive relationships between companies and customers, suppliers and partners regarding environmental management and green innovation can help companies to gain a competitive advantage. Organisational collaboration with suppliers who provide environmentally friendly raw materials and are willing to help achieve ecological goals and competitive advantage will lead to the production of innovative products, processes and managerial (Chiou et al., 2011). This will improve the company's environmental performance, thereby enabling the achievement of competitive advantage by having superior products, processes and management. Healthy interactions with suppliers are necessary for the number and value of supplier alliances to increase so that companies can ensure the quality of environmentally friendly products and services offered by suppliers (C.-L. Huang & Kung, 2011). Today, companies are increasingly encouraged to minimise environmental costs in the life cycle of their product systems (Hart & Dowell, 2011). In NRBV's view, through product stewardship, a company can (1) get out of a business that is harmful to the environment; (b) redesign existing product systems to reduce liability; and (c) develop stone products with lower life cycle costs. This study proves that there is a significant positive relationship between green structural capital and green competitive advantage. These findings support Rezaei et al. (2016) and Chen (2008) who noted similar findings. Green structural capital is the management and generation of knowledge in dealing with environmental problems effectively, which supports employee productivity (Yahya et al., 2014). Companies in the medium-sized manufacturing industry in Bali Province set detailed environmental protection rules and regulations, have a sound environmental protection management system, make adequate investments in environmental protection facilities and form teams to address environmental protection issues. In NRBV, this is one way of achieving a competitive advantage because the market for green products is rarely large or profitable from the start and it is, therefore, necessary to do competitive pre-emption (Hart, 1995). In this way, the resulting quality and growth of environmentally friendly products or services is better, which is difficult for competitors to imitate. Managerial attention and framing of environmental concerns have been identified as affecting an organisation's ability to enact a proactive environmentally beneficial strategy (Hart & Dowell, 2011). NRBV views that this is an important factor for the development of a sustainable development strategy. Managers cannot find profitable opportunities if they do not seek them. Therefore, the ability of an organisation to benefit from environmental protection is highly dependent on managers' expectations that these opportunities exist (King & Lenox, 2002).

6. Conclusion

This study found significant, positive relationships between environmental consciousness and three types of GIC - green human capital, green relational capital and green structural capital. Environmental activities are one of the bases for the company's strategy formulation in the medium-sized manufacturing industry in Bali Province. High environmental consciousness is a successful strategy to improve green management (i.e. GIC). Viewing environmental issues is important because environmental consciousness leads to increased behaviour and practice. By considering environmental issues positively, the company demonstrates a more progressive environmental strategy and uses more resources in GIC. Having environmental consciousness is not enough for the company; it needs harmony with intellectual capital. This study also found significant, positive relationships between GIC and green competitive advantage. This shows that green intangible assets, namely GIC, play a crucial role in achieving green competitive advantage. Companies that place GIC as important to the organisation have compliance with environmental regulations and use company resources properly in order to obtain a green competitive advantage. Thus, GIC can play a role in facilitating company profits to increase their competitive advantage. An important contribution of this research is to provide an understanding for manufacturing company managers about the role of green management and intangible assets to gain a competitive advantage over their competitors.

This research also contributes to providing an understanding that in order to achieve a competitive advantage, the interaction between business organisations and the environment cannot be ignored. The strategy and competitive advantage of business organisations in the environmental era are rooted in their ability to facilitate environmentally sustainable economic activities. Another contribution of this research is to enrich the current conceptualisation of intellectual capital by proposing an integrated model that explains the role of environmental consciousness and GIC with green competitive advantage. The findings of this study have implications for company managers in the middle manufacturing industry in Bali Province to understand that going green through the adoption of green practices can contribute to green competitive advantage. Company managers in the industry must understand environmental issues and proactively implement environmental policies, thereby creating environmental consciousness. When environmental consciousness is formed, green-oriented intellectual capital can be developed, which in turn will play a role in creating a green competitive advantage. This study provides evidence that environmental management plays a significant role in companies. This has implications for academics to explore further about environmental issues, its relation to intellectual capital and its contribution to competitive advantage in order for natural resource-based views and intellectual capital-based views to keep on being developed.

This study has limited generalisation because it focuses on firms in the medium-sized manufacturing industry. Further research can be carried out on companies in non-manufacturing industries or other industrial sizes. This study did not examine the direct relationship between environmental consciousness and green competitive advantage. Future academic research can examine this direct relationship to determine whether environmental consciousness has a direct relationship with the achievement of green competitive advantage. This study also did not examine the mediating role of GIC in the relationship between

environmental consciousness and green competitive advantage. Therefore, further research can examine the role of this mediation to determine whether GIC is a full or partial mediator in the relationship between environmental consciousness and green competitive advantage.

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References

- Ahmed, N. U., Montagno, R. V., & Firenze, R. J. (1998). Organizational performance and environmental consciousness: an empirical study. *Management Decision*, 36(2), 57–62.
- Allameh, S. M. (2018). Antecedents and consequences of intellectual capital The role of social capital, knowledge sharing. *Journal of Intellectual Capital*, 19(5), 858–874.
- Altarawneh, I. (2017). Effect of intellectual capital on competitive advantage in the Jordanian pharmaceutical companies. *European Journal of Business and Management*, 9(5), 39–53.
- Astuti, P. D., Chariri, A., & Rohman, A. (2019). Association between intellectual capital and competitive advantage: a case study on the hotel industry in Bali Province, Indonesia. *Humanities & Social Sciences Reviews*, 7(4), 440–449.
- Berry, M. A., & Rondinelli, D. A. (1998). Proactive corporate management: environmental new industrial revolution. *Academy of Management*, 12(2), 38–50.
- BPS-Statistics of Bali Province. (2019). *Bali Province in figures 2019*. BPS-Statistics of Bali Province.
- Buyse, K., & Verbeke, A. (2003). Proactive environmental strategies: a stakeholder management perspective. *Strategic Management Journal*, 24(5), 453–470.
- Chang, C.-H., & Chen, Y.-S. (2012). The determinants of green intellectual capital. *Management Decision*, 50(1), 74–94.
- Chaudhry, N., Bilal, A., Awan, M., & Bashir, A. (2016). The role of environmental consciousness, green intellectual capital management and competitive advantage on financial performance of the firms: an evidence from manufacturing sector of Pakistan. *Journal of Quality and Technology Management*, 12(2), 51–70.
- Chen, Y.-S. (2008). The positive effect of green intellectual capital on competitive advantages of firms. *Journal of Business Ethics*, 77(3), 271–286.
- Chen, Y.-S. (2011). Green organizational identity: sources and consequence. *Management Decision*, 49(3), 384–404.
- Chen, Y.-S., & Chang, C.-H. (2013). Enhance environmental commitments and green intangible assets toward green competitive advantages: an analysis of structural equation modeling (SEM). *Quality & Quantity*, 47(1), 529–543.
- Chen, Y.-S., Lai, S.-B., & Wen, C.-T. (2006). The influence of green innovation performance on corporate advantage in Taiwan. *Journal of Business Ethics*, 67(4), 331–339.
- Chin, W. W. (1998). Commentary: issues and opinion on structural equation modeling. *MIS Quarterly*, 22(1), vii–xvi.
- Chiou, T. Y., Chan, H. K., Lettice, F., & Chung, S. H. (2011). The influence of greening the suppliers and green innovation on environmental performance and competitive advantage in Taiwan. *Transportation Research Part E*, 47(6), 822–836.
- Dwyer, R. J. (2009). “Keen to be green” organizations: a focused rules approach to accountability. *Management Decision*, 47(7), 1200–1216.
- Ferrell, O. C., LeClair, D. T., & Ferrell, L. (1997). Environmental activities related to social responsibility and ethical climate. *Journal of Marketing Management*, 7(2), 1–13.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, XVIII(1), 39–50.
- Greeno, J. L., & Robinson, S. N. (1992). Rethinking corporate environmental management. *Columbia Journal of World Business*, 27(3/4), 222–232.
- Haden, S. S. P., Oyler, J. D., & Humphreys, J. H. (2009). Historical, practical, and theoretical perspectives on green management: an exploratory analysis. *Management Decision*, 47(7), 1041–1055.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2013). *Multivariate data analysis: Pearson new international edition*. Pearson.
- Hart, S. L. (1995). A natural-resource-based view of the firm. *Academy of Management Review*, 20(4), 986–1014.
- Hart, S. L., & Dowell, G. (2011). A natural-resource-based view of the firm: fifteen years after. *Journal of Management*, 37(5), 1464–1479.
- Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. *Advances in International Marketing*, 20(January), 277–319.
- Hitt, M. A., Bierman, L., Shimizu, K., & Kochhar, R. (2001). Direct and moderating effects of human capital on strategy and performance in professional service firms: a resource-based perspective. *Academy of Management Journal*, 44(1), 13–28.
- Huang, C.-L., & Kung, F.-H. (2011). Environmental consciousness and intellectual management. Evidence from Taiwan’s manufacturing industry. *Management Decision*, 49(9), 1405–1425.
- Huang, C. L., & Kung, F. H. (2010). Drivers of environmental disclosure and stakeholder expectation: evidence from Taiwan. *Journal of Business Ethics*, 96(3), 435–451.
- King, A., & Lenox, M. (2002). Exploring the locus of profitable pollution reduction. *Management Science*, 48(2), 289–299.
- Klein, D. A., & Prusak, L. (1994). *Characterizing intellectual capital*.

- Lin, Y.-H., & Chen, Y.-S. (2016). Determinants of green competitive advantage: the roles of green knowledge sharing, green dynamic capabilities, and green service innovation. *Quality & Quantity*, 51(4), 1663–1685.
- Longoni, A., & Cagliano, R. (2015). Environmental and social sustainability priorities: their integration in operations strategies. *International Journal of Operations & Production Management*, 35(2), 1–11.
- Menguc, B., & Ozanne, L. K. (2005). Challenges of the “green imperative”: a natural resource-based approach to the environmental orientation-business performance relationship. *Journal of Business Research*, 58(4), 430–438.
- Naffziger, D. W., Ahmed, N. U., & Montagno, R. V. (2003). Perceptions of environmental consciousness in U.S. small businesses: an empirical study. *SAM Advanced Management Journal*, 68(2), 23–32.
- Nidumolu, R., Prahalad, C. K., & Rangaswami, M. R. (2013). Why sustainability is now the key driver of innovation. In *IEEE Engineering Management Review* (Vol. 41, Issue 2, pp. 30–37).
- Nivlouei, F. B., & Khass, E. D. (2014). The role of green intellectual capital management in acquiring green competitive advantage for companies. *International Journal of Management Research and Development*, 4(2), 41–58.
- Nunnally, J. C. (1978). *Psychometric theory*. McGraw-Hill.
- Omar, M. K., Yusoff, Y. M., & Zaman, M. D. K. (2017). The role of green intellectual capital on business sustainability. *World Applied Sciences Journal*, 35(12), 2558–2563.
- Peteraf, M. A., & Barney, J. B. (2003). Unraveling the resource-based tangle. *Managerial and Decision Economics*, 24(4), 309–323.
- Porter, M. E., & Linde, C. Van Der. (1995). Green and competitive: ending the stalemate green and competitive. *Harvard Business Review*, 73(5), 120–134.
- Qassim, R. (1994). Environmental management in industry: historical evolution and future perspectives. *International Journal of Technology Management*, 9(1), 129–132.
- Ramus, C. A., & Steger, U. (2000). The roles of supervisory support behaviors and environmental policy in employee “ecoinitiatives” at leading-edge European companies. *Academy of Management Journal*, 43(4), 605–626.
- Reed, K. K., Lubatkin, M., & Srinivasan, N. (2006). Proposing and testing an intellectual capital-based view of the firm. *Journal of Management Studies*, 43(4), 867–893.
- Rezaei, S., Izadi, M., Jokar, I., & Rezaei, S. (2016). The relationship between green intellectual capital and competitive advantages. *International Business Management*, 10(20), 4743–4748.
- Schlegelmilch, B. B., Bohlen, G. M., & Diamantopoulos, A. (1996). The link between green purchasing decisions and measures of environmental consciousness. *European Journal of Marketing*, 30(5), 35–55.
- Sharma, S., & Henriques, I. (2005). Stakeholder influences on sustainability practices in the Canadian forest products industry. *Strategic Management Journal*, 26(2), 159–180.
- Wirtenberg, J., Harmon, J., & Fairfield, K. D. (2007). HR’s role in building a sustainable enterprise: insights from some of the world’s best companies. *Human Resource Planning*, 30(1), 10–20.
- Yahya, N. A., Arshad, R., & Kamaluddin, A. (2014). Measuring green intellectual capital in Malaysian environmentally sensitive companies. *International Journal of Business and Management Study*, 1(2), 92–96.
- Yaseen, S. G., Dajani, D., & Hasan, Y. (2016). The impact of intellectual capital on the competitive advantage: applied study in Jordanian telecommunication companies. *Computers in Human Behavior*, 62, 168–175.
- 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.



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