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Achieving Green Competitive Advantage Through Organizational Green Culture, Business Analytics and Collaborative Competence: The Mediating Effect of Eco-Innovation

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Abstract *This research determines to inspect the contribution of the eco-innovation (EI) in transforming the organizational green culture (OGC), business analytics (BA) and collaborative competence (CC) to enhance of green competitive advantage (GCA). Structural equation model was developed to illustrate connection between organizational green culture, business analytics, collaborative competence, eco-innovation and GCA by escorting a survey of 169 Indonesian state-owned company managers. These results reveals that OGC has a sig. positive effect on EI, business analytics does not have a sig. positive clout on EI, CC has a significant positive clout on EI, organizational green culture has a positive clout on GCA, business analytics has no positive clout on GCA, CC has no positive clout on GCA and EI has a sig. positive clout on GCA, while EI as a partial mediator between organizational green culture and GCA, eco-innovation is not a mediating variable between business analytics and GCA and EI as a full mediator between collaborative competence and GCA. This research expands the debate by examining eco-innovation and business analytics in obtaining GCA of how companies can spring up with the well-being system.*

Keywords — ***Indonesia, Organizational green culture, Business analytics, Collaborative competence, Eco-innovation, Green competitive advantage, State-Owned Enterprise***

I. INTRODUCTION

Monetary outcome has a huge consequence on the overall achievement from a non-financial viewpoint. The rise in environmental concerns in different sectors is for the sake of decision-makers facing the public's sensitivity, regulatory legislation on environmental rules and shareholder pressure to pay more deliberation to the environment, rendering non-financial output a significant performance. From the regulatory side, the government carries out monitoring through the relevant ministries to control company activities regarding implementation to decrease environmental damage. Ministry of Environment and Forest (KLHK) said that occurred in Indonesia throughout 2019, which reached 1.5 million hectares, occurred since long-drawn of dry season and high land clearing through the burning process (CNBC, 2020). Furthermore, KLHK appointed one of board commissioner of PT. PMB, as a suspect in the impairment of the Sei Hulu Lanjai protected forest in Batam City, is currently detained at the Salemba Class I Detention Center, Central Jakarta. KLHK's Criminal Law Enforcement Director declare that the crime of environmental destruction is a grave crime. The suspect is charged with up to 10 (ten) years' imprisonment and a paramount fine of IDR 10 billion.

The causes of environmental matters are rising in line with the uplift of demographics, technology, wealth and the exploitation of nature resources. Resource and environmental problems are essential aspects in the steady growth of business competitiveness. As a distinction of the growth and complexity of the universal economy, interest in companies' competitiveness has increased and awareness of environmental matters is required. Environmental problems which become more severe and involve a highlight on the competitiveness of a sustainable business through the incorporation of conservational aspects in its economic activities.

The critical aspects in the strategy for reaching a GCA is the fulfillment of organizational green culture. Management will lead workers to embrace eco-innovation as the organization's fundamental value and to become more interested in environmental matters (Wang, 2019). Culture reveals the principles, values, ideas, and attitudes that shape the actions of companies. Via management teams, corporate culture could be built principles to achieve company goals (Gao, 2017). Organizational green culture encourages workers to cognize that the company's eco-innovation is a core concept and affirm that they have interested in environmental matters.

Business analytics point that it encounters an important function in business, but it still very little cognizance of how business analytics influences company efficaciousness and the sufferable combativeness of the entities. Although the concepts for analytical skills and analytics technology have been described in several previous studies, there has been no research that explains the dimension and how contribute to company and the endurable competitiveness of companies.

Competition occurs in nowadays between networks of organizations and individuals who combine their expertise and resources efficiently and effectively so that succeed in the world economy. Recently, through exchanging capital, knowledge and risks, businesses are seeking to reinvent their company and retain their competitive edge through collaboration. Despite the reality that cooperation has significant advantages, however, previous research has recorded high rates of failure among collaborative firms (Bititci et al., 2008).

Companies must also improve their sustainability in all aspects by eco-innovation, to answer to ecology matters. This is achieved to preserve competition and scale down the environmental effects. Companies must assess critical matters regarding whether eco-innovation can improve entities performance both monetary and non-monetary.

II. LITERATURE REVIEW

A. *Legitimacy Theory*

Legitimacy theory emphasize on the interactions between companies and communities. This is the view that the entities often aims to establish balance between the societal principles in its operations and the prevalent norms in society's social structure that businesses are piece of the system (Solikhah, 2016). Support will be disposed to legitimate business operations, both from the applicable legislation where the entity is headquartered and support from the local citizenry by guarantees that the company's activities will not be impeded. In satisfying the beliefs of society, the fundamental thing is to behave in satisfying with social rules and principles (Freedman & Jaggi, 2005). If these rules and values are applied, then the entities legitimacy will be obtained.

Deegan (2002) conveys that if found an interaction in the outcomes desired from the firm by the community, business credibility can be obtained, so no demand from the society. To retain the trust granted, businesses are anticipated to be committed to the community. To maintain legitimacy, companies must spread environmental actions by disclosing their social environment (Berthelot & Robert, 2011). Business will make social environment disclosures as piece of the attention company with meet to culture. Pro-environmental disclosure is deemed helpful in preserving, improving and sustaining the legitimacy acquired (Hadjoh & Sukartha, 2013). If the entity is committed to exposing the social locale, this will foster public confidence.

B. *Green Competitive Advantage (GCA)*

Sustainable corporate is also familiar as green corporate. A sustainable corporate is a corporate endeavor to minimize adverse ecological and social effects such that future generations have enough resources to fulfill their desires and to succeed in the long-lived. According to (Haseeb et al., 2019), in a competitive world, sustainable business output is very critical for success. (Larson, 2000) say that sustainable business is an pro-environmentally and socially conscious strategy coupled with functional practice that both escort entities towards a better-kept and healthier universe alongside offer a path to increased profits. (Bell & Stellingwerf, 2012) said that sustainable business claim highly motivated entrepreneurs who mark to address social issues, watch to recruitment, steadily growth and training of the exact people in business to handle human capital. According to (Ménard, 2010), the stand of a steadily business can highlight a business model with different principles from traditional business models and more business ideas for companies. Many business leaders recognize that leaders must get engaged in addressing today's global challenges and devise plans for businesses to spin to the steady business by selling environmentally friendly goods. Companies transitioning to sustainable businesses need results that can encourage a steady business where the manpower can provide business ideas and the eco-production of goods. According to (Huppes & Ishikawa, 2005) economic, environmental, and sociable performance are the core aspects play-act in sustainable business performance. The gigs of the three elements above are to intensify ecology performance, deplete costs, improve entities image, lift down the risk of non-compliance, increase marketing excellence, lift corporate relationships and social responsibility (Rao & Holt, 2005). Industry 4.0 uses technology to deliver market efficiency that is defensible (Haseeb et al., 2019).

C. **Organizational Green Culture**

Nowadays, since the vast amount of environmental pollution that is directly nexus to the world's manufacturing sector, the perceptiveness of human to environmental thoughtfulness has increased (Chen, 2008). Environmental powers, such as government environmental policies, national and foreign environmental policies, shareholder advocacy and environmentalism, beyond combative pressures, impact business operations (Rugman

& Verbeke, 1998). Thence, businesses have lack alternatives but to enforce operations in the scoope of environmental conservation to pursue with international environmental shelter and consumer awareness regulations (Rondinelli & Berry, 2000). Despite this adherence, because of competitive reasons, businesses could take blame for having a harmful reaction on the climate (Chen, 2008). The right environmental policies or standards can encourage EI which in fact reduces costs, increases productivity or makes companies more competitive. Currently, environmental awareness has carried out quickly since it is deliberated a vital problem for consumers, for example, there is global warming. OGC denotes as managerial act, processes, maneuverings or concepts that could relief entities achieve corporate ecology goals, adhere to environmental policies, envisage the environmental crashes of company operations, snap up steps before regulation to minimize waste and emissions or explore positive ways to take supremacy of business opportunities by enhancement environmental efforts efficiently and effectively (Chen, 2008). By take across of creative environmental technology, organizations that implement a constructive environmental management approach will unify environmental sustainability priorities with different divisions within the institution to fulfill environmental issues (Molina-Azorín et al., 2009). The urgency for green management is forbye imply to predict and plan environmental problems and to integrate organizational strategies (Martinez, 2014). Therefore, the basic scope of management have to be in congruence with the habitual environment because the habitual environment can influence corporate strategy. In addition, businesses will integrate the viewpoint of green goods in the layout and wrapping of the things to uplift their advantage in product differentiation. Investments in resources in ecology management do not avoid environmental protests or punishments, but instead growth the efficiency and capacity of resource production (Chen, 2008). For businesses or organizations, environmental durability is critical and many businesses want to aspire to create EI and green design. Because a few of the strengths of stakeholder environmentalism, economic threat and environmental legislation, businesses will decide the executed of ecology management (Rondinelli & Berry, 2000; Rugman & Verbeke, 1998).

D. **Business Analytics**

Business analytics discuss around applicable measurable intelligence by data-based decision making for strategic and well-planned business objectives (Stubbs, 2011). Data knowledge spectrum – analytics corresponds to a grander stage and is specifically linked to decision base systems. An analytical elements of BI is business analytics (Davenport, 2006). Market analytics and categorized BI and BA are expanding into unstructured content from BI. Big data and BA projects, typically, encompass divergent departments, and require entities transformation at multiple degrees, they build an attractive environment with some unplumbed areas (Mikalef et al., 2020). BA can be distinct as a flow that initiate with the gathering of business-related data and contain of the sequential actualization of the core analytical components that are descriptive, predictive, and prescriptive also the verdicts of which help business decision-making, organizational success and illustrate it. Stubbs (2011) believes that BA is beyond than ordinary analytics, it requires clear relevance, resulting insights that credibly implemented, alongside performance and value measurements to ensure successful business results. Not to speak of, BA will answer questions such as why something is going on, what new patterns may arise, what's going to happen next, and what's the best practice forward for the afterward. BA has the similar methods as standard analysis, but occurs the additional requirement that the ending of analytical analysis have a measurable outcome on success (Schniederjans et al., 2014).

E. **Collaborative Competence**

Hickman and Silva suggest that eight organizational configurations of the hereafter in reaction to reform, namely managing global markets, building alliance between the civil and private enterprise, balancing competition with collaboration, drawing investors into corporate environments, accepting corporate responsibility, designing. new pattern of organizations, item integrating sub cultures and tuning every employee. The lever of change to a latest interdependent organization is by interorganizational relationship building; (1) developing network capacity by using each resource to be slice of the network management (2) developing partner competence so that there is an optimal fit (good match) and between partners being compatible, (3) developing management competencies, namely the mindset and expertise of partners as the basic for networks. Limerick and Cunnington then gave the term this new form of organization as a network organization and within the network organization lies the heart of what it calls collaboration. Strengthening the explanation above, any organization currently faces turbulent challenges which reaction in each organization being interdependent each another. Antidote to these conditions by building collective capacity through stakeholder collaboration efforts. The shift from independence to collaboration has prominent implications for; (1) Freedom and autonomy, regarding the unit that comes and enters collaboration is independent and then chooses cooperation; (2) Autonomous units in organizations that work together towards collective goals; (3) Interdependence between partners, who were previously self-reliant (independent); (4) Compound of strengths that reinforce to cover the fragility of each collaborating unit. Two things that stated, namely (1) the executives of link between entity in the long-lived requires new, interdependent forms in the prototype of networks; (2) Central mechanism in

networks called the discovery of cooperation. The word collaboration in enterprise is often converged with the modernistic model of entity in the long-lived. An alternative to strategy grasp in the slice of business partnership.

F. **Eco-Innovation**

Horbach et al. (2012) shows the prime emphasis is the particular type of eco-innovation as contradictory to innovation typically. In eco-innovation, to minimize environmental matters, the emphasis is on innovation. In eco-innovation there are interested parties (companies, politicians, entities, associations and households) developing new ideas, making products, using products or introducing ecologically sound products. Horbach et al. (2012) emphasizes that unsustainable buildout is the consequence of technological changes that are too rapid. Social innovation, such as lifestyle changes, is therefore important for solving environmental problems (Halila & Hörte, 2006). Meanwhile, to judge and compare eco-innovation in different companies, a scale is needed (unit of measurement). Several attempts made to classify or categorize innovations, mostly come up from the significant level of innovation/methods/procedures used during development. Classification method contrasts the innovation classification system in this analysis and uses crucial characteristic adaptations for the longing of evaluating eco-innovation. For the test to be declared, a categorization of hundreds of contributions was created to the yearly report in Nutek, Sweden at the environmental innovation contest that was held in 1998-2004. According to (Halila & Hörte, 2006) there are six categories of eco-innovation consisting of: (1) Product care (category 1). Product care is a continuation of existing products or innovative innovations that are turned into biodegradably sustainable products in category one, so that only ordinary information is the knowledge required. (2) Slight upgrade of goods (category 2). Tiny mutate to the goods, including small improvements to the goods or just a small piece of the modified components. Awareness about a specific company or product is the knowledge needed. (3) Big enhancement of goods (category 3). A particular knowledge base nexus to the product needs significant product enhancement. A recent product or a radical improvement, not only drew on the previous model, to an existing product. (4) Creativity in a practical way (category 4). Functional innovation is a latest way to fulfill functions, with new solutions, this way refers to knowledge gathered from other fields of technology. (5) Originality in the method (category 5). Innovation of systems is the substitute of current systems with new ones with potential innovative contributions that can transform the scoope of awareness of new changes in technical systems holistically. (6) Scientific breaktrough (category 6). An ecollogically innovation can have an impression on a huge scale or on many industries.

G. **Hypothesis Development**

Owing to competitive reasons, several businesses take blame for having a bleak outcome on the climate (Chen, 2008). The right environmental policies or standards can encourage EI which in fact reduces costs, increases productivity or makes companies more competitive, as claimed by (Chen et al., 2006). Today, environmental awareness has been pulled off quickly since it is thought-out a big concern for customers, e.g., there is global warming.

OGC is specified as managerial routines, mechanism, approaches or notion that assist entities secure corporate ecology goals, adhere to pro-environmental policies, conjecture the environmental significance of entities operations, also measures to alleviate junk and pollution before regulation or seek doubtless ways to snap up benefit from business prospects through environmental enhancement in increasing the company's ecological activities effectively and efficiently (Chen, 2008; Rondinelli & Berry, 2000). Managers in entities with a green culture are more foreseeable to tackle ecology protection measures, boosting entities green innovation. Therefore, businesses distinguish their potential for EI from opposite by sketching corporate culture to boost environmental quality norms (Wang, 2019).

H1: Organizational green culture (OGC) effect positively to eco-innovation (EI) significantly.

BA feasibly agreed as mechanism that starts with business-related data compile along with the sequential application of the essential descriptive, predictive, and prescriptive analytical components, whose results support and demonstrate business decision-making and organizational efficiency (Stubbs, 2011) believes that BA is over than just ordinary analytics, it requires clear relevance to the entity, resulting insights that would implement, along with accomplishment and value measurements to ensure successful business results. All areas of monetary and social growth namely supply management, organizational supervision and social public administration will be clouted by BA and big data. BA lift up enterprises' data-driven culture, which allows businesses to scan the universe and produce new products (Zameer et al., 2020).

H2: Business analytics (BA) effect positively to eco-innovation (EI) significantly.

Companies are finds out to reinvent their business and maintain their GCA through collaboration by sharing resources, information and risks. With relief of the aggregate and bunch of insight that exchanged, particularly for green innovations, where initiatives have longer-term outcomes and resources are pooled or jointly secured for a long-term effort, businesses can boost innovation through business collaboration (Calza et

al., 2017). Transparency also increases the precision with which businesses can prepare new product growth, which is grave for the affluent launch of modern products (Yu & Lee, 2020), since it is one of way to bring up ability of entities to show their excellence through use of resources that enable entities to grow up (Mulyasari & Murwaningsari, 2019).
H3: Collaborative competence (CC) effect positively to eco-innovation (EI) significantly.

According to Haseeb et al. (2019), sustainable business performance is fundamental for success in a competitive environment. Larson (2000), said that sustainable business is a socially and environmental conscious strategy and operating practice that both guide entities towards a wiser and healthier universe and overture a path to increased profits. Competitive profit encompasses to a leading act in the industry that helps a company outperform its rivals (Porter & Van Der Linde, 2017). The solid OGC helps employees appreciate the organization's environmental strategy. OGC is piece of the organization's core values, if the GCA depends on adequate employee actions and business worth, then a positive OGC will benefit a company (Wang, 2019).
H4: Organizational green culture (OGC) effect positively to GCA significantly.

Companies carrying out eco-friendly business practices have a frame of concern for protecting and preserving the bordering environment. Companies that switch to steady businesses need performance that can support a sustainable business, not to mention employees who accord business ideas and product advancement. According to (Huppes & Ishikawa, 2005), economic, ecology, and social completion are the three dominants elements of long-term entity performance. The arguments of the elements above are to stimulate pro-environmental performance, deplete costs, improve entities image, reduce the threat of non-compliance, increase marketing excellence, lift up corporate relationships next to CSR (Rao & Holt, 2005). Data and information created based on expertise, competitive circumstances, and changing business demands to generate faster, more precise, and effective choices for all areas of the organization, including finance, accounting, sales, and marketing (Widhiastuti et al., 2018). As believed by (Haseeb et al., 2019), industry 4.0 utilizes technology to produce sustainable business performance. The leading advantages of using BA include enhanced efficiency, deplete risks, scale down costs, quicker decision-making, better syllabus, and monetary portrayal (Peppard et al., 2018).
H5: Business analytics (BA) effect positively to GCA significantly.

Entities seek to embellish their workers' abilities and talents to earn a competitive supremacy. A cooperation organization's efforts are intense on expertise, skills; the forte of its human resources or personnel to retain competitive advantage. Human resources play generating value by developing individual skills and exchanging insight in the entity to supply chain also operations management (Toopgajank et al., 2019). Entities who paid scrutiny to the three areas mentioned above - strategy, organization, and capability development - fared better in their cooperation efforts. These initiatives helped a small number of entities not only support their existing business objectives, but also construct new value. As a upshot of their endeavor in cultivating intelligence, they were able to pursue tactics that could not be reproduced by competitors, particularly those that included teamwork, alongwith outsourcing. Collaboration had become a fount of GCA for these businesses (MacCormack et al., 2014).
H6: Collaborative competence (CC) effect positively to GCA significantly.

(Bell & Stellingwerf, 2012) said that sustainable business requires highly motivated entrepreneurs who intent to address social issues, give heed to recruitment, steady growth and coaching of the exact people in business to handle human capital. Innovation, abstract commodity in the ecofriendly sector as in other sectors that is decisive for competitive mileage and more internationally for the victory's organization (Chen, 2008). Any company's ultimate investigate is to increment profit and favorable outcome, gained by bringing value across the axis business processes to the customers (Chan et al., 2016). Innovation is piece of prime forces to lift up entity competitive edge. With more environmental legislation, when making product and design flow decisions, understanding the whole product life cycle is becoming growingly important (Chiou et al., 2011). The entity will choose several attributes that are counted by buyers in a sector as important dimension and the organizations strives to place its position uniquely to gratify the longing of these buyers. If the consumer believes that the distinction produced by the entity is important from any source of differentiation gave rise by the firm, customer would be willing to bear for the products of the enterprise at a higher price than the products of the competitors (Damayanti & Augustine, 2019).
H7: Eco-innovation (EI) effect positively to GCA significantly.

Sustainable business performance is critical to success in a competitive environment (Haseeb et al., 2019). CA connotes to a superior emplacement in the industry that allows a entity to surpass its competitors (Porter & Van Der Linde, 2017). Robust OGC relief employees to comprehend the company's environmental

strategy. If GCA on employee habits and business values is appropriate, benevolent OGC can be beneficial for the entity (Wang, 2019). Many companies accept the responsibility to bear a negative clout on the environment due to strategic considerations (Chen, 2008). Currently, environmental awareness has been arising quickly because it is considered as a major for consumers, for example, global warming. Environmental management is distinct as a managerial activity, process, approach or concept that be able to help a company achieve its environmental goals, obey with environmental policies, anticipate clout on the entities operating environment, take walk to reduce pollution and pre-regulation or discover unwavering ways to assemble decisions taking edge of prospects. through pro-environmental improvement in increasing effective and efficient corporate environmental activities (Chen, 2008). Top supervisor in entities whose culture is cognated with environmental preservation are tend to accomplish ecology safeguarding rules, increasing the organization's green innovation.

H8: There is a significant positive clout of OGC on GCA with eco-innovation as an intervening variable.

Companies that switch to a durable business, need performance that can support a sustainable business. According to (Huppes & Ishikawa, 2005) the main elements involved in durable performance are economic performance, ecology performance and community social performance. The intention of the three elements above is to enhance ecology upshot, scale down costs, improve corporate image, reduce the risk of non-compliance, increase marketing excellence, lift up relationships and CSR (Rao & Holt, 2005; Ruf et al., 2001). According to (Haseeb et al., 2019), industry 4.0 utilizes technology to produce sustainable business performance. HBR global survey confirmed that few of the element benefits of implying BA include lift up productivity, scale down risk, deplete costs, accelerated decision making, better programming, and superior monetary performance (Peppard et al., 2018). (Stubbs, 2011) believes that a BA is beyond just plain analytics, it requires clear relevance to the entity, the resulting insights that be up to implemented, along with enactment and value measurements to ensure successful business outcomes. BA and big data will clout each elements of moentary and social development namely production, operations alongside public social management. BA enhances the data-driven culture in entities, which enables companies to scan the ecology and elevate innovative products (Zameer et al., 2020).

H9: There is a significant positive clout of business analytics on GCA with eco-innovation as an intervening variable.

Organizational efforts for alliance are based on insight, skills; competence of individual resources or workman in maintaining CA. A vital piece is played by individual resources in shaping value over increasing individual competencies and sharing insight within the entity with reference to supply chain and engagement management (Toopgajank et al., 2019). Their investment in capacity building, in turn, creates options for pursuing strategies that competitors cannot replicate; especially those managing collaboration such as outsourcing. For these entity, linkup washed-up a origin of competitive edge (MacCormack et al., 2014). Through business collaboration, companies can increase innovation thanks to the amount and diversity of insight that possibly shared, especially for green innovation, where projects have long-term results and resources are pooled or secured together for long-term efforts (Calza et al., 2017). This kind of openness also increases the accuracy that companies can imply to schedule recent product development, which is essential to successfully launching modern products (Yu & Lee, 2020).

H10: There is a significant positive clout of collaborative competence on GCA with eco-innovation as an intervening variable.

III. METHOD

A. *Research design*

The investigation is a causality study intensed on the exploration matters, with the snapshot of paper in hypothesis testing, namely, first, the mark on eco-innovation of the nexus among organizational green culture, BA and collaborative competence. Second, the clout on GCA of the connection between organizational green culture, business analytics, collective competence and eco-innovation. Third, to verify whether eco-innovation holds a role in mediating the nexus between organizational green culture, business analytics and collaborative competence on GCA. The unit of analysis is an individual.

The Measurement – The model has five constructs, i.e. organizational green culture, business analytics, collaborative competence, eco-innovation and GCA. Six-point likert scale along with 6 categories; (1) absolutely disagree to (6) absolutely agree was implied. The measures were tailored drew on the recent exploration (Table 1).

Table 1. Measurement Variable

Latent variable	Items	Dimensions	Indicators
Organizational green culture (Gandhi Heryanto & Augustine, 2017; Küçükoğlu & Pinar, 2018; Wang, 2019)	6	Company's internal values	Environmental on corporate goals
		Standards of ethical behaviour	Internal policy about environmental
		Engagement to environmental protection	Environmental preservation
			Adaptive culture
			Communication program for employees.
Business analytics (Duan et al., 2020)	6	Descriptive analytic	Business intelligence
			Data mining
		Predictive analytics	Statistical model
			Forecasting
		Prescriptive analytics	Optimisation
			Simulation
Collaborative competence (Liu & Huang, 2018)	8	Information sharing competence	Interchange information related buyer need and preferences
			Interchange information related technology of the focal service
			Interchange information related efficacious and unefficacious experiences with services
		Joint innovation competence	Propensity to engage in joint elaboration of latest production
			Ability to foster new technology
		Coordination competence	Fervor across buyer-supplier are well coordinated
			Coordinate firm strategies across buyer-supplier
			Transfer knowledge across buyer-supplier
Eco-Innovation (Tseng et al., 2013; Wang, 2019)	11	Green production innovation	The innovation product related energy saving.
			The innovation product related pollution-prevention.
			The innovation product related waste recycling.
			The innovation product related no toxicity.
			The innovation product related green product design.
		Green process innovation	The process innovation related energy saving.
			The process innovation related pollution-prevention.
			The process innovation related waste recycling.
			The process innovation related no toxicity.
		Eco-managerial innovation	Providing ecology awareness seminars and training for stakeholders.
		Eco-technology innovation	Investment in infrastructure and green equipment.
			Expansion of a systematic strategy for material saving.
			System of control and transition of technology.
GCA (Damayanti & Augustine, 2019; Pratono et al., 2019; Wang, 2019)	8	Innovation differentiation	Investing in generating new capabilities.
			Latest method of serving customers.
		Market differentiation	Hard to imitate.
			The services are unique.
			New products concerning the entrepreneurial social responsibility percept.
			Recent product incorporate insight and image of eco-sustainability.

Source: Own Elaboration

OGC is a managerial activity, process, approach or concept that upkeep companies achieve corporate ecology goals, adhere to pro-environmental policies, conjecture environmental consequences of entity operations, take measures to detract rubbish also smog before rules or seek doubtless ways to take benefit from business prospects through environmental enhancement in increasing the company's ecology activities (Chen, 2008; Rondinelli & Berry, 2000).

BA specify usage of measurable intelligence for strategic and tactical goals by data-based decision-making (Stubbs, 2011). Data-knowledge spectrum – to a higher stage and is specifically linked to decision base network. The insight and intelligence to backing decision-making and strategic desire is BA (Goes, 2014).

The best mechanism for cooperation between organizations is collaboration in an entities sense, if the entity craves to get what it wants. Alliance is a term for collaboration that execute to the good. To reinforce this presumption, (Raharja, 2009) denotes the collaboration as pulling together to seize goals as desired by human,

groups, agency or entity to produce meaningful and sustainable outcome. The partnership between organizations in alliance, and cooperation can exist with these relationships. (Morsink, 2014) suggested collaboration as a joint endeavor to plan, implement and judge a program in which exist (contained) joint or coordinated action taken by manpower to achieve (joint) team goals. The occurrence of interpersonal and interorganizational relationships, the program will be lighter to implement.

Horbach et al. (2012) point the special form of eco-innovation compared to innovation in commonly is the critical feature. In eco-innovation, it is attentive on creation to decrease environmental problems. Eco-innovation has stakeholders (companies, politicians, entities, associations and households) developing new ideas, making products, using products or introducing ecologically sound products.

Sustainable business is very critical for success in a competitive setting, according to Haseeb et al. (2019). Larson (2000) said that sustainable business is a socially and environmentally conscious strategy and operating practice that both guide entities towards a wiser and healthier universe and offser a path to increased profits.

B. **Data collection**

Managers of State-Owned Enterprise in Indonesia are the imply of this exploration. Managers become targets considering they are decision-makers with company resources and can accomodate the required knowledge. The sample election procedure is executed by convenience sampling technique, namely the technique to pick samples by chance meeting with the researcher and by chance tendering to the criteria, the respondent will turn out be the mine of data (Augustine & Kristaung, 2013). The data used is primary data, questionnaires which distributed to respondents to be answered. The questionnaire was imply with likert scale in intervals of 1-6, the interval scale is implied because besides could be classified and sequential, has a precise mathematical gap, too (Augustine & Kristaung, 2013). Scale is compiled for independent variables; OGC, BA and CC, the predicted variable; GCA, intervening variables; eco-innovation.

C. **Analysis data**

The methodology is split into two, can be clarified below. Descriptive analysis is a statistic that applicable to dissolve data by describing or describing the assembled data as is without the intention of making conclusions that execute to generalization. Descriptive statistics was the composing of data in the tables, graphs, calculating the median, mean, standard deviation, and percentage calculations. The data originate from the answers given by the respondents to the items accomodate in the questionnaire. Furthermore, the researcher will work on the data and then leave an explanation. In conformity with the formulated hypothesis, inferential statistical data analysis uses the SEM approach using SmartPLS software.

Evaluation of Measurement Model. Three kinds of tests conducted to appraise model measurement. The test is convergent validity test. This test is to notice which indicators are good for measuring each variable or to look validity of each indicator. A high factor loading value notice that the indicator does explain the variables it measures. Indicators that have factor loading value between 0.5-0.6 are acceptable and conversely if below this value, it will turn out to be removed when doing this test. Internal consistency test, this test is conducted to inspect reliability of a bunch of indicators in measuring the variables it measures. The value seen is the CR and cronbach's alpha attained from SmartPLS estimation results. The suggested is >0.60. Discriminant validity, this test is conducted to notice how many variables vary each other. The value point in this test is the derived average variance (AVE) value obtained as the product of the calculation, where the value have to >0.50 (Purwanto et al.,2021). The next condition is AVE for each variable, have to grander than the correlation value with other variables. Assesment of the structural model using R-square. Transform in the R square value used to look the clout of such independent latent factors on the criterion latent variable.

Direct Effect Analysis, explain that the fraction of significance usage a differentiation of t-table values and t-statistics. The hypothesis is taken on if the t-stat is grander than the t-table or distinct to the p-value with the α value used. The hypothesis could be agreed if the t-stat more than t table or p-value less than 0.05. Indirect Effect Analysis, the link among the predictor and criterion variables is captured by the itervening effect, via the connecting or mediating variable.

IV. RESULT AND DISCUSSION

A. ***Result***

This exploration seeks to distinguish the influence on GCA of OGC, BA, and collaborative competence with EI as a intermediary variable. The object is an Indonesian state-owned enterprise. A State-Owned Enterprise is a corporate company that the state owns all or most of the capital through direct participation derived from separate state assets. SOE are occupied in several sectors. SOE has two forms, namely the

Company Business Entity also the General Business Entity. Cause by the small study population in SOE, the preference of SOE is acquired from factors and has centered on enterprise in the similar sector in earlier exploration.

Prime data was implied, the questionnaire to measure five variables, namely OGC, business analytics, collaborative competence, GCA, and eco-innovation. After a general potrayal of the respondents, it is accompanied by data quality checking, classic assumption test of regression equations, hypothesis assessment and discussion of the outcomes of hypothesis testing. Smart PLS version 3.3.2 was applied.

The exploration data was composite by allocating questionnaires to SOE's managers in Indonesia using google form, the dividing out of questionnaires was enacted for 3 weeks starting from 6-26 January 2021 via electronic media, to save time filling and rebound the questionnaire. 169 questionnaires are the aggregate of questionnaires issued. Table 2 below offers a profile of the 169 surveyees who took part in this census.

Table 2. Respondent Profile

	Respondent	%		Respondent	%
Gender			**Work Experience**		
Male	128	75.7%	5-10 years	24	14.2%
Female	41	24.3%	11-15 years	61	36.1%
Age			16-20 years	35	20.7%
30-35 years	43	25.4%	> 20 years	49	29%
36-40 years	47	27.8%	**Current Education**		
41-45 years	47	27.8%	Bachelor Degree	100	59.2%
> 45 years	32	18.9%	Master Degree	61	36.1%
Business Domicile			Doctoral Degree	8	4.7%
Jakarta	129	76.3%	**Type of Industry**		
Outside Jakarta	40	23.7%	Transportation	Health	
Department			Banking	Telecommunication	
Human Resources	21	12.4%	Infrastructure	Manufacture	
Business Development	55	32.5%	Tourism	Mining	
Marketing & Sales	37	21.9%	Oil & Gas	Education	
Production	16	9.5%	Fertilizer	Financial Services Non-Bank	
Finance, Accounting &Tax	14	8.3%	Forestry	Plantation	
Information Technology	26	15.4%	Food	Energy	

Source: Own Elaboration

From table 2 above, it points that hugest of the respondents were male, namely 128 (75.7%) while female was 41 (24.3%) and the most respondents was between 36-40 years old, 47 (27.8%) and 41-45 years old, 47 (27.8%), while those at least over 45 years old were 32 (18.9%). The company's domicile is shacklaed by 76.3 percent at Indonesia's capital city (Jakarta) and 23.7 percent outside Jakarta. In this report, the departments with the predominant respondents were 32.5% from the unit of business development. For the maximum working period between 11-15 years the similiar number of 61 people (36.1%). Meanwhile, bachelor's degree education dominated the last education by the similar number of 59.2%. The distinction of managers in BUMN Indonesia identified from the respondent's profile: 1) they are male dominated, 2) they are of a dynamic working age, 3) most domiciled in Jakarta, 4) they hold a working duration of less than 15 years.

Statistic descriptive. The OGC variable has a min. value 2.286, a max. value 6, mean 5.031 and a standard deviation (SD) of 0.67. From these results, the mean OGC variable is grander than the SD denoting that the it is good considering it has a small standard error. The BA variable has min. value 2, max. 6, mean 5.061 and SD of 0.639. From these results, the mean BA variable is grander than the SD denoting that it is good considering it has a small standard error. The CC variable has min. 3, max. 6, mean 5.06 and SD 0.526. From these results, the mean CC variable is grander than the SD denoting that it is good considering it has a small standard error. The EI variable has min. 2.154, a max. 6, a mean of 4.997 and SD of 0.66. From these results, the mean EI variable is grander than the SD denoting that it is good considering it has a small standard error. The GCA variable has min. 2, max. 6, a mean of 5.029 and SD of 0.69. From these results, the mean GCA variable is grander than the standard deviation denoting that the data is good considering it has a small standard error.

Validity test. To investigate the validity of each indicator, this test is conducted to notice the indicators are suitable for measuring each variable. A high factor loading value leads that the indicator does explain the variables it measures.

Table 3. Validity and Reliability

Variable	Cronbach's Alpha	Composite Reliability	AVE	Item	Outer Loadings	VIF
Organizational Green Culture (OGC)	0.936	0.949	0.758	OGC1	0.816	2.443
				OGC2	0.814	2.764
				OGC3	0.914	4.723
				OGC4	0.903	4.471
				OGC5	0.922	4.922
				OGC6	0.848	2.876
Business Analytics	0.942	0.953	0.773	BA1	0.877	3.457
				BA2	0.900	4.051
				BA3	0.847	2.361
				BA4	0.877	3.795
				BA5	0.879	3.897
				BA6	0.895	4.740
Collaborative Competence	0.915	0.931	0.627	CC1	0.731	3.334
				CC2	0.777	3.885
				CC3	0.820	3.284
				CC4	0.830	2.933
				CC5	0.782	2.480
				CC6	0.755	2.440
				CC7	0.841	3.398
				CC8	0.791	2.843
Eco-Innovation	0.965	0.969	0.741	EI2	0.749	2.426
				EI3	0.912	6.923
				EI4	0.854	4.218
				EI6	0.885	5.726
				EI7	0.839	4.599
				EI8	0.899	6.412
				EI9	0.891	6.363
				EI10	0.883	5.156
				EI11	0.887	5.064
				EI12	0.815	2.888
				EI13	0.839	4.164
Green Competitive Advantage (GCA)	0.947	0.956	0.731	GCA1	0.802	4.120
				GCA2	0.912	9.817
				GCA3	0.917	11.463
				GCA4	0.835	3.637
				GCA5	0.837	5.201
				GCA6	0.818	5.989
				GCA7	0.907	5.972
				GCA8	0.799	3.903

Source: Own Elaboration

Table 3 shows that all question items show an outer loadings value of grander than 0.7 except for the questions OGC7, EI1 and EI5. According to Hair et al. (2017), the indicator is declared to meet convergent validity, if the outer loadings has a value higher than 0.70, so we delete the questions OGC7, EI1 and EI5 because the outer loading is lower than 0.70. Thus, there were 39 valid questions in this report. The AVE for the OGC variable is 0.758, the BA variable is 0.773, the CC variable is 0.627, the EI variable is 0.741 and the GCA variable is 0.731. As note by Hair et al. (2017), a variable is declared valid if its discriminant validity has a value of greater than 0.50, consequently all variables contrive the requirements for measuring discriminant validity.

It points that the composite reliability (CR) for the OGC variable is 0.949, the BA variable is 0.953, the CC variable is 0.931, the EI variable is 0.969 and the GCA variable is 0.956, where the CR for all variables is grander than 0.70. According to (Hair et al., 2017), a variable is declared reliable if its composite reliability value has a value higher than 0.70, thus all variables are reliable. The Cronbach's alpha for the OGC variable is 0.936, the BA variable is 0.942, the CC variable is 0.915, the EI variable is 0.965 and the GCA variable is 0.947. According to Hair et al. (2017), the variable is denotes reliable if the Cronbach's alpha has a value higher than 0.60, thus each variables are reliable.

Table 3 points that the VIF for all indicators is lower than 10. According to Hair et al. (2017), in formative indicators, a VIF value grander than 5 indicates a possible collinearity problem. The authors applied reflective indicators, thus there was no multicollinearity matters in this model.

Table 4. Coefficient Determination

Independent Variable	Dependen Variable	R-Squared
OGC	EI	0.608
BA		
CC		
OGC	GCA	0.791
BA		
CC		
EI		

Source: Own Elaboration

Table 4 connotes that 60.8% of the variation of the criterion variable (EI) can be illustrated by the predictor variable (OGC, BA and CC) while the left over 39.2% is clouted by alternative variables outside of this exploration and 79.1% the variation of the criterion variables (GCA) can be illustrated by independent variables (OGC, BA, CC and EI) while the left over 20.9% is convinced by alternative variables outward this paper.

Table 5. Direct Effect Test

Variable	Coefficient	T-Statistic	P-Values
OGC → EI	0.698	7.452	0.000
BA → EI	0.012	0.121	0.452
CC → EI	0.130	1.552	0.061
OGC → GCA	0.230	3.735	0.000
BA → GCA	0.057	0.782	0.217
CC → GCA	0.046	0.559	0.288
EI → GCA	0.638	9.334	0.000

Source: Own Elaboration

Direct Effect Analysis. Table 5 point that the OGC variable to EI have positive β, 0.698 and a t-statistic 7,452. Probability indicates a value lower than 0.05, namely 0.000. The significance is tinier than α = 5%, so the 1st hypothesis is successfully supported or H0 is denied. This study succeeded in proving that OGC has a sign. positive clout on EI.

Drew on table 5, the BA to EI variable point positive β, 0.012 and a t-statistic 0.121. The probability shows a value grander than 0.05, namely 0.452. The significance is grander than α = 5%, so that H2 is not approved or H0 is accepted. This study fizzles out to validate that BA has a sign. positive clout on EI.

Hinged on table 5, the CC variable to EI point positive regression coefficient of 0.130 and a t-stat of 1.552. The probability shows a value grander than 0.10, namely 0.061. The significance level is tinier than α = 10%, thus the 3rd hypothesis is supported or H0 is denied. This study succeeded to validate that collaborative competence has a sign. positive clout on EI.

The OGC variable to GCA point a positive β, 0.230 and a t-statistic 3,735. Probability indicates a value lower than 0.05, namely 0.000. The significance is tinier than α = 5%, thus the 4th hypothesis is successfully supported or H0 is denied. This study succeeded in proving that organizational green learning has a significant doubtless clout on GCA.

Based on table 5, the BA variable to GCA denotes a positive β, 0.057 and a t-statistic 0.782. The probability shows a value grander than 0.05, which is 0.217. The significance is grander than α = 5%, thus the fifth hypothesis is rejected or H0 is accepted. This study fruitless to validate that BA has a sign. positive clout on GCA.

Drew on table 5, the CC variable to GCA denotes a positive regression coefficient of 0.046 and a t-stat of 0.559. The probability shows a value grander than 0.05, which is 0.288. The significance level is grander than α = 5%, thus the 6th hypothesis is failure supported or H0 is accepted. This study failed to validate that collaborative competence has a significant concrete clout on GCA.

Based on table 5, the EI variable on GCA denotes a positive β, 0.638 and a t-stat of 9,334. Probability indicates a value shorter than 0.05, namely 0.000. The significance level is lower than α = 5%, thus the 7th hypothesis is successfully supported or H0 is rejected. Eco-innovation has a major positive sign. on the GCA.

Table 6. Indirect Effect Test

Variable	T-Statistic	P-Values

OGC → EI → GCA	5.446	0.000
BA → EI → GCA	0.123	0.451
CC → EI → GCA	1.617	0.053

Source: Own Elaboration

Indirect Effect Analysis. The results display OGC has a straight relationship with GCA, OGC has subsequent relationship with GCA because the partial of the OGC on the GCA has a significance 0.000 and the partial test of the EI on the GCA has a significance of 0.000 while the specific indirect clout of the OGC variable on GCA through EI has significance of 0.000, thus the EI variable is a partial mediator on the OGC variable to the GCA variable. Thus, the eight hypothesis is supported or H0 is rejected.

The findings denote that BA had no direct nexus with the GCA, and BA had no indirect connection with the GCA because BA on the GCA had a sign. 0.217 and the partial of the EI on the GCA has a sig. 0.000, while the specific indirect clout of the BA variable on GCA through EI had a sign. of 0.451, thus the EI variable is not a mediating on BA to the GCA variable. Thus, the nine hypothesis is refused or H0 is accepted.

Collaborative competence has no direct nexus with GCA and collaborative competence has indirect nexus with GCA because the partial of the CC on the GCA has a sig. 0.288 and the partial test EI on the GCA has a sig. of 0.000, while the specific indirect clout of the CC variable on GCA through EI has significance of 0.053, it can therefore be inferred that the EI variable is a full mediator on the OGC and the GCA variable. Thus, the tenth hypothesis is accepted or H0 is rejected.

B. ***Discussion***

OGC has a notable positive clout on EI. These results prove that good OGC will enlarge EI in a entity. By paying concern to company priorities, strategies, adaptation activities and environmental-related programs, businesses must preserve the consistency of corporate green culture. The outcome are constant with research from (García-Machado & Martínez-Ávila, 2019; Küçükoğlu & Pinar, 2018). Under the dominance of sustainability drivers, while businesses are setting up activities to diminish their negative clout on the ecology along beside to make extra systematic use of their manufacturing capital, these businesses are moving to some enhancement in their goods and processes. Eco-friendly activities in innovation are stable with one of these improvements. Corporate culture plays a meaningful role in organizations' acceptance of eco-fiendly innovation practices. If the culture of a company continues to encourage green outcome and this escort to stay on the critical of creating latest ideas, it encourages the entity to raise sum value and helps seize the goals (Küçükoğlu & Pinar, 2018). Therefore, organizations urgency to unify resources as parallel with capabilities to elevate green innovation. To foster green culture in all over the society marketplace, both countries must answer the environmental challenge. It is meaningful to innovate processes and services for the motive of eco-friendly performance. The good of the populace and culture, all this works. Promoting such green practices involves reducing energy appliance and toxic pollution, treating pollutant waste and confirming that the ecosystem and society health are covered by a sustainable environment (García-Machado & Martínez-Ávila, 2019).

It notes that BA does not have a substantial positive significance on EI in the inspection of the hypothesis. These results prove that the applying of BA in a entity will not clout the eco-innovation activities declared by the entities. The findings are unsteady with research from (Duan et al., 2020). Entity in Indonesia have not yet good sagacity about the effective and efficient appliance of BA.

Collaborative competences have notable positive clout on eco-innovation. These results prove that the competence employees in liaising with stakeholders has dominion on the eco-innovation activities derived by the entities. It fit with the examination of (Yu & Lee, 2020). Collaboration declared by the entities is intended to keep the company's image, to upgrade new ideas for innovation. To increase eco-innovation, companies also require to improve market capabilities so they could provide services according to consumer needs (Calza et al., 2017). **The collaboration also will make stronger impact if the employees have willingness to work on it, more than requested their supervisor (Aman, 2019).**

OGC have a notable positive clout on GCA. Culture of a entities that pays concern to the ecosystem will uplift the agressiveness of the enterprise with other businesses. It compatible with (Küçükoğlu & Pinar, 2018). Cultural success is a strong competitive advantage. However, companies that develop a great culture will facet the precondition of the fast-paced, customer-centric, digital world in we live. Businesses are starting to well-known that culture should not left to chance (Mcgregor & Doshi, 2015). A entity culture contributes practices that bear an environmental effect will inspire company workers to create innovative ideas, thus the productivity of the entities will carry forward to increase.

Business analytics have no sig. positive clout on the GCA. These findings show the company's use of BA does not lift up the productivity of the entities from an ecology perspective. Thus, inconsistent with research from (Zameer et al., 2020). Few entities, the targeted GCA may emerge more plausible and obtainable. These mayhap encompass a fresh campaign, an worldwide alliance, a job spinning or simply striving to draw the accustomed encounters in a exigently dissimilar way (Pratono et al., 2019).

Collaborative competence does not bear a notable positive clout on GCA. These results prove that the collaborative competence of manpower in each company won't have an impact on the agresiveness of green companies. It was not matched with the exploration of (Liu & Huang, 2018). Companies' desire to work united is not to broaden the productivity of the entities, but to preserve long-term relationships.

Eco-innovation has a notable positive clout on GCA. These results prove that the entity environmental innovations can boost the company's agresiveness from an environmental outlook. It is congruence with research from (Küçükoğlu & Pinar, 2018). From a monetary and non-economic viewpoint, companies that conduct eco-innovation gain. They can bring down the company's operating costs, increase efficiency, improve products the company produces, which will conclude in rising GCA. **The right strategy of eco-innovation is a part that important to be determine in entities to lift up value to produce a green competitive advantage in time ahead (Fitria, 2021).**

The results denote that organizational green culture has a direct nexus with GCA and organizational green culture has an indirect nexus with GCA because the partial of the OGC on the GCA has a sig. 0.000 and the partial of the EI on the GCA has a sig. 0.000 , while the specific indirect clout of the OGC variable on GCA through EI has a significance of 0.000, so it be capable to summarized that the EI variable is a partial mediator among the OGC and the GCA variable. This result connote that the 8th hypothesis is successfully supported or H0 is rejected.

The results point that business analytics does not bear a direct relationship with GCA and BA does not bear an indirect relationship with GCA because the partial of the BA on the GCA has a sig. 0.217 and the partial of the EI on the GCA has a sig. 0.000, while the specific indirect clout of the BA variable on GCA through EI has a sig. of 0.451, so it be capable to summarized that the EI variable is not true as mediating between the BA and the GCA variable. This result denotes that the 9th hypothesis is not successfully supported or H0 is accepted.

The results point that collaborative competence does not own a direct nexus with GCA and collaborative competence has an indirect nexus with GCA because the partial of the CC on the GCA has a sig. 0.288 and the partial of the EI on the GCA has a sig. 0.000, while the specific indirect clout of the CC variable on GCA through EI has a sig. of 0.053, so it summarized that the EI variable is a full mediator among the CC and the GCA variable. This result denotes that the 10th hypothesis is successfully supported or H0 is rejected.

V. CONCLUSION

The conclusion in this exploration is to expand research on GCA by investigate the clout of OGC, business analytics, collaborative competence and the mediating clout of eco-innovation. The upshot of this exploration are that organizational green culture has a sig. positive clout on eco-innovation, business analytics has no significant positive clout on EI, CC has a sig. positive clout on EI, organizational green culture has a doubtless clout on GCA, business analytics does not own a concrete clout on GCA, CC does not own a concrete clout on GCA and EI has a sig. doubtless clout on GCA, while EI as a partial mediator among organizational green culture and GCA, eco-innovation is not a mediating between business analytics and GCA and eco-innovation as a full mediator between collaborative competence to GCA.

It is sensible that entities have an obligation to grant a occupy at the obstacle as exposition that have not thus far augmented that compulsory OGC rather than chop the task off. Basically, the main thing is that their culture should always be strengthened by top management to maximize their GCA. Alongside, they also required to sharpen their eco-innovation by encourage their manpower to give fresh idea that suit for sustainability company goals.

The summary was resultant from the survey at the state own enterprise in Indonesia. To postulate the upshot, it desires to be cloned together with company in dissimilar industry. The poll was raised from the managers that whatsoever deputize the entity. This exploration boosts the time ahead research to examine more precious findings by interviewing others stakeholders (especially from environmental department), who could grant to the worth creation at GCA. There is chance to explore other value, economic value that springs from GCA. When firms concern about environmental aspect, they desire to deliberate about environmental cost that they ought to pay off.

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