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Effect of Green Management on Green Shipping, Green Technology Innovation, Sustainable Economy, and Environmental Performance

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Abstract

The Shipping Industry faces the challenge of reducing environmental damage due to its operational activities. Green Management is an effort of the company's commitment to contribute and care about environmental protection. Green management research implemented in the shipping industry is still limited. This paper examines the effect of Green Management on shipping companies to adopt Green Shipping, which in the end, green shipping has an impact on Green Technology Innovation and sustainable economic and environmental performance. This study uses smart PLS, testing data from a survey conducted on 80 shipping companies in Samarinda. The analysis reveals that Green Management influences shipping companies to carry out green shipping and will ultimately affect Green Technology Innovation, sustainable economic and environmental performance. This paper discusses his findings on shipping companies to prove their importance in the environment in the shipping industry.

Keywords: *Green Management; Green Shipping; Environmental Performance; Sustainable Economy*

Introduction

Issue environment at the time this gets attention from whole global society, degradation global environment and demands consumption energy make global community is committed to developing sustainably. Sustainable Development Goals (SDGs), which are deal world leaders aim to end poverty, reduce the gap and protect the environment. SDGs contain 17 Goals and 169 Targets which are expected could achieve by 2030.

Untacd (2018) Show The supply chain around the world is changing in the era of globalization. Component manufactured products are shipped and transported from various existing locations throughout the world. Choice transportation sea Becomes second most voted for transport goods around the world. Yang et. al (2013) Increased trading volume and willing companies get to profit from scale economy, causing the world fleet to increase, which intensifies worries about the impact of activity delivery, such as GHG, waste, pollution sound, and ingredient toxic. Poulsen et.al (2016) found the Problem of the marine environment quite extensive, global climate, Human health caused by global shipping, so enhancing environment left behind other industrial sectors. Benamara, et.al (2019) show as holder interest, major maritime industry international play a role important in global sustainability. IMO (2017) stated to respond problem environment as well as control the number of pollutants from activity cruises good on nor under the surface sea, so organization International Convention for the Prevention of

Pollution From Ships (MARPOL) and the International Maritime Organization (IMO) arrange company cruises for reducing amount pollution air and water from activity operation them.

Study this aim for analyzing the impact of Green Management on Green Shipping and the impact of Green Shipping on performance environment and sustainable economy as well as pressure IMO regulations governing about prevention pollution for sustainability encouraging nature company to pay attention to and participate in sustainability environment and development sustainable

Hypotheses Development

Green Management, Green Shipping, Green Technology Innovation

Helfre and Boot (2013) show Sediment liquid and solid from operation cruise cause pollution that has an impact on ports and surrounding areas. Green shipping is a series of adopted practices and efficiency in activity delivery (Lai, et al, 2011); (Shi et.al, 2018); (Hjelle, 2018). Operation routine or accidents originating from business cruises result in an impact environment that motivates effort to improve system management. Green shipping involves innovation, fan procedure technology to preserve the environment and trade as well as push ecopreneurship like impact environment including pollution air (SOx, NOx), Water pollution (Spills oil, water ballast) and products waste.

Transportation sea in Europe has an impact on the environment that becomes attention from government agencies and citizens. Regulation Europe and global push attention for reduce the impact of toxic gas inside pollution air, increase performance machine for reducing amount emission, push boat for use the power in the port and use ingredient burns new like natural gas or hydrogen. Other activities to reduce the amount of pollution at sea by keeping waste on the boat and then throwing it away at the port, recycling ship material by creating a network ecology demolition ship, and implementing a practice environment at stage construction (Walker and Adebambo, 2018). Operation routine at the port causes an impact environment; it found that water pollution occurs from ballast water, diesel waste, and residue cargo (Abadie et.al, 2017)

Green management or environmentally sustainable management has a destination for convincing condition profitability and participation more companies big, so that has more commitment big to protection environment (Abadie et.al, 2017). Green management is related to environmental protection, recycling, and reducing gas emissions (Cario et.al, 2019).

Impact harmful environment from operation cruise grow worries public so that push significant improvement in regulation environment, law, Actions, and directions and forms other around the world (Abadie et.al, 2018). To push company cruise to pay attention impact environment so worry Public strengthened by government and representative bodies Public such as IMO and Regulation Government. International Maritime Organizations (IMO) that exist in the Prevention of Pollution from ships (MARPOL) gives instruction about the waste generated by ship and arrange the type of pollution (walker et.al, 2010); (Cario et.al, 2019); (Kim, 2015) Regulation Environment from the International Maritime Organization is growing gradually; the IMO Convention regulates construction boats to reduce greenhouse gas (GHG) emissions by around 15% to 20% by 2020 and to 30% by 2025. Besides that, IMO too agreed to regulations at the Assembly of the marine environment protection committee (MEPC) regarding internal GHG regulations and revised Marine Pollution (MARPOL) to reduce the emission of carbon dioxide (CO2) from ships in 2030 at the meeting of general MEPC'S in 2012 (Kim, 2015). Based on the literature on such a hypothesis study, these are:

H1. Green Management has a positive influence on Green Shipping

H2. Green Shipping has a positive influence on Green Technology Innovation

Sustainability Economy

A sustainable economy is an economy that meets the needs generation moment, however, without sacrificing the ability to Fulfill the needs generation future (Kim et.al, 2015). Industry maritime international hold role important to global sustainability (Benamara et.al, 2019). Industry maritime support world trade and facilitate the global economy with giving contributing to the main goals of the SDGs, special for conserving and utilizing resources, seas, and oceans (Zhu et.al, 2013). The cost Protection environment has increased significantly for the company (Cormier and Elliot, 2017). A sustainable economy refers to the practice of good environment-related delivery and influences the economy as well as society to nature. So the growing interest of many companies in checking and handling problem environments (Ruerco Vito, 2018). Based on the literature on such a hypothesis study, these are:

H3. Green shipping has a positive effect on Sustainability Economy

Environmental Performance

Freight chest containers and crate terminal packs up is part important in infrastructure transportation; several reports find a lack of proof to support the argument that benefits exceed the cost in chase initiative protection environment (Farrrel et al, 2003). Problem pollution appears because emission ship on level infrastructure because the terminals already develop from handling payload local Becomes center distribution (Cofala et.al, 2007). Environmental performance refers to the results obtained in the development solution boat to ensure quality, efficiency, defense, and protection. Related Green Shipping Practices protection of the environment and improve the productivity of the company (Lun et.al, 2010). Based on the literature on such a hypothesis study, these are:

H4. Green shipping has a positive effect on Environmental Performance

Research Method

In research, this first is linking green management to green shipping and its impact on continuity economy and performance environment that can be seen in the model below this

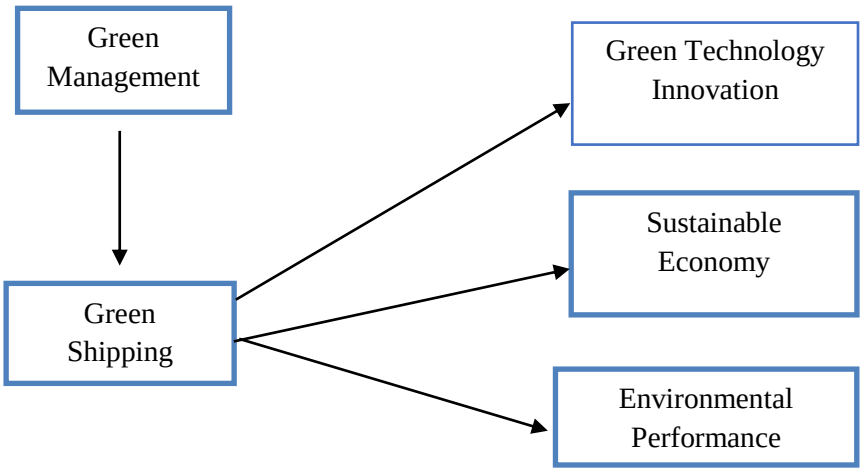

Figure 1. Figure Research Model

Research Model

Variable Green Shipping according (Felicio, 2021) consists of seven indicators Among others: The consumptions efficiency inside the ship, fuel consumption in travel, traffic congestion at the port, ship efficiency design, air pollution or greenhouse gas emission, sea pollution by the ship, and water pollution with ballast. Variable Green management according (Felicio, 2021), consists of onboard recycling of materials, ship equipped with environmental technologies, separation of waste on board, ship noise in port terminals, and ship's waste and oil recycling in the harbor. Environmental performance, according to (Raza, 2020); (Huang et.al 2016), consists of four indicators, among others of, environmental protection, environmental efficiency, and environmental quality, while sustainable economy variables according (Felicio, 2021) consist of five indicators among authors of the scale of economies of the ship, productivity gains, fleet growth, economic competitiveness, and economic growth. Green Technology Innovation, according to (Raza, 2020) (Lam, 2015), consists of three indicators Adopted Energy measures for ships in the fleet, implemented a ship energy monitoring system, Using technical equipment that reduces pollution

Data Collection and Measures

Data in a study this collected through a questionnaire about perception important whether or not variables in Green Management, Green Shipping, Environmental Performance, and Sustainable Economy. Variable is measured with the use scale Likert starting from 1 (not important) to 7 (extremely important). Quisonere shared the company's existing cruise disguised as see perception manager and operational company cruise department. The questionnaire containing the map was closed based on the literature for analysis in accordance with the hypothesis put forward. Questions consist of perceptions regarding Green Management, Green Shipping, Environmental performance, and sustainable economy. From about 120 questionnaires to the Shipping Company that we deployed, about 80 questionnaires were Returned and valid for could process.

The study this conducted to analyze the perception of an employee of company cruise boats about problems environment and sustainable economy and performance affected environment from the activity they as well as for knowing the influence of Green Management on Green Shipping that will affect Environmental Performance and Sustainable Economy and Green Technology Innovation

Table 1. Construct items

Latent Construct	Label	Item	Source
Green management	GM 1	consists of onboard recycling of materials	
	GM 2	a ship equipped with environmental technologies	Felicio (2021)
	GM3	separation of waste on board	
	GM4	ship noise in port terminals	
	GM5	ship's waste and oil recycling in the harbor	
Green Shipping	GS 1	consumptions efficiency inside the ship	Felicio (2021)
	GS 2	fuel consumption in travel	
	GS3	traffic congestion at the port	
	GS4	ship efficiency design,	
	GS5	air pollution or greenhouse gas emission	
	GS6	sea pollution by the ship	
	GS7	water pollution with ballast	
Green Technology Innovation	GTI1	Adopted Energy measures for ships in the fleet	(Raza, 2020);(Huang et.al, 2016)
	GTI2	implemented a ship energy monitoring system	
	GTI3	Used technical equipment that reduced pollution	

Sustainable Economy	SE1	Scale economies of the ship	(Felicio, 2021)
	SE2	Productivity gains	
	SE3	Fleet growth	
	SE4	Economics competitiveness	
	SE5	Economic growth	
Environmental Performance	EP1	Reduction of air emissions (e.g., CO2, SOx, and NOx)	(Raza, 2020) (Lam, 2015)
	EP2	Reduction of water pollution	
	EP3	Reduction of waste (rubbish, oily waste, and sludge)	
	EP4	Improved compliance with environmental regulation	

To ensure the validity and reliability of the data in the survey, conducted a number of steps, among others; first, consider all appropriate literature, trials, and questionnaire to 5 companies' cruise part operations and managers. Study this using Smart PLS; the first step to take with evaluating the measurement model. Cronbach alpha value is used to test reliability, internal consistency, and reliability test outer loadings.

Table 2. Convergent Validity and Reliability of the measurement model

latent construct	Label	Cronbach alpha	Rho A	Composite Reliability	AVE
Green Shipping	GS1	0.878	0.886	0.907	0.619
	GS2				
	GS3				
	GS4				
	GS5				
	GS6				
Green Management	GM1	0.847	0.864	0.889	0.616
	GM2				
	GM3				
	GM4				
	GM5				
Environmental Performance	EP1	0.798	0.800	0.869	0.625
	EP2				
	EP3				
	EP4				
Sustainable Economy	SE1	0.831	0.846	0.888	0.665
	SE2				
	SE3				
	SE4				
Green Technology Innovation	GTI1	0.788	0.793	0.876	0.701
	GTI2				
	GTI3				

Reliability test for measure level consistency and stability of research instruments in measure something draft or construct the value of Cronbach alpha and composite reliability > 0.70 so that all variable reliable. Based on the results, Convergent validity data processing in a study this fulfilled because the AVE value > 0.50

Table 3. Result of discriminant validity testing

Latent construct	Environmental Performance	Green Management	Green Shipping	Green Technology Innovation	Sustainable Economy
Environmental Performance	0.791				
Green Management	0.759	0.785			
Green Shipping	0.722	0.661	0.788		
Green Technology Innovation	0.576	0.502	0.439	0.837	
Sustainable Economy	0.772	0.665	0.808	0.678	0.815

Measurement of the structural model or inner model shows direct connection and not direct Among exogenous and endogenous latent variables.

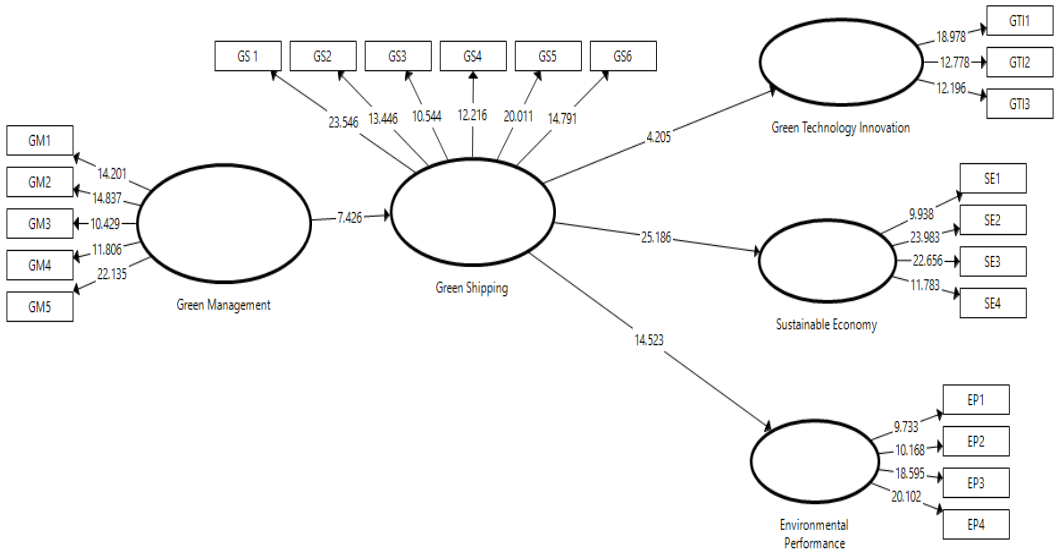

Figure 2. Research Model Result

Table 3. Result of the structural model

Hypothesis	Original samples (O)	Sample Mean	Standard Deviation (STDEV)	T Statistics	P Values	Result
Green Management →Green Shipping	0.661	0.672	0.089	7,426	0.000	Supported
Green Shipping →Environmental Performance	0.722	0.735	0.050	14,523	0.000	Supported
Green Shipping →Green Technology Innovation	0.439	0.454	0.105	4.205	0.000	Supported
Green Shipping →Sustainable Economy	0.808	0.818	0.033	24,361	0.000	Supported

Discussion

A number of studies previously emphasized (Felicio, 2021) issue environment and increasing cost protection environment to reach sustainable development and create power competitively. The boat is the main source of pollution in cities surrounded by ports, so the issue environment has become very important (Farrel, 2003); however not yet been found proof that the benefits obtained exceed the cost initiative of protecting the environment. However possible to increase the performance of the business and reduce the negative effect of the user management environment (Montabo et. al, 2013). Holder key policies like IMO admit that estimated emissions from shipping activities will multiply double by 2050

Profit economy for company research (Lun et.al, 2014) shows that Green Shipping affects economy scale based sustainability economy ships, fleet growth, and upgrades productivity and performance arch based on quality environment and protection environment. Green management related with cycle repeat materials and waste as well as type equipment used _ on a ship that has impact pollution sea and air from activity ship. Activity is the most dominant ship in identifying the delivery-friendly environment that will contribute to consumption ingredient burn, jam, cross-ship, and design ship. So that hypotheses 1, 2, 3, and 4 in a study this confirmed and accepted.

Conclusion

Contribution main study this the importance of green management in the implementation of Green Shipping to respond to regulation environment regulated by IMO, EU, and rules governing the environment. Green Management and Green Shipping can increase awareness of company cruise for operating with notice sustainability and creating innovation for efficient source power and reduce amount pollution. In the end, the results of the research also find the importance of green shipping for reducing impact pollution; in the end, have positively affected and impacted the economy for companies and sustainable economy large as well as improved environmental performance.

Study this is context specific and must be generalized with being careful inside study this only perception from employee company voyage in Samarinda study next could consider perception agency government involved in the shipping industry.

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