

# Health, Safety, Security and Environment (HSSE) Perception at the Ferry Port Terminal: A case study at Merak, Banten Province, Indonesia

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**ABSTRACT**— *Health Safety Security and Environmental (HSSE) concept are commonly used to assess company's operating performance and their supply chain majority at oil and gas industry. However, this concept has largely been underutilized within the ferry port terminal's operation. This study asks whether the HSSE principles can be applied in the ferry port terminal in Indonesia. In particular, it examines whether Ferry port terminal of Merak can be considered as Ecoseaport. The term 'Ecoseaport' is used instead of 'Ecoport' as commonly apply in European countries. It focuses on major ferry port terminals at inter-island hub because of the increasing volume and movement of people and vehicles in the last five years. This research is in line with the Indonesia government policy on 'Maritime Axis' and is relevant with the cancellation of the Sunda Strait bridge development. Through the multi-dimensional scaling, this research ultimately aims to contribute to the improvement of knowledge of stakeholders that will influence the formulation and implementation of policy and stands appropriately of HSSE aspect. Multi-Dimensional Scaling approach of this research is intended to transform respondents through similarity or their preferences which are represented in constructed a multi-dimensional space variables of Ecoseaport principles through HSSE aspect approached. It was concluded that during Muslim's feast period with number of motor cycle and vehicle variables were drastically increased than normal operation will affected to HSSE performance. Perception majority of respondent involved parties has put safety and security aspect as the priority. Meanwhile, health cases that reported by port medical officer is the major concerned which need takes attention into port management operation.*

**Keywords**— Ecoseaport, HSSE, Multi Dimensional Scaling

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## 1. INTRODUCTION

Merak port was situated in Banten Province Indonesia, is a public port inter island that serving between western tip of Java and southern Sumatra island with approximatelay 30.6 km away. Port harbour Merak is the gateway of cross paths land connecting between Java and Sumatra island. Merak port has land area coverage of approximately 15 hectares, with physical boundaries territorial at north and east side to the hills, west and south side to Sunda strait. Inter island ferry port at Bakauheni is a public port that serving the crossing between the south end of Sumatra to tip of western Java island. To realize an effectiveness and efficient of transportation system, it should be directed to improve services by bringing together to their interests or expectation amongst relevant services parties. Whereas number of vehicle and motorcycle are continue increased every year, especially during holiday and annual muslim's feast period in regard home coming and back flowing traditions to their home town. In the view, area for services improvement related to infrastructure and supporting facilities are essential implemented shall taken into immediate effectively and efficiently to be able its transportation system have realible, quality services, pricing affordability, safety and bring HSSE concept into their operations.

One of strategy to improve ferry port terminal is by implemented Ecoseaport concept, instead of Ecoport terms that normally use in Europe. A port by implement Ecoseaport or green concept may lead to healthy and environmental sounds to develop port is being useful in terms of social, economic and ecological, and become a prerequisite in respect port would like to compete in the global transportation arena (Despina et al., 2011). Through Ecoseaport concept, various of environmental issues in the port such a deteriorated of sea water quality, air pollution and noise, reduce biodiversity, reduction of health condition and safety are systemically designed, implemented, monitored, reviewed, re-implemented

and organize by port management, including stakeholder. This cycle will continue endlessly or never ending process for environment quality improvements (Rickard and Egels, 2012). Eco-seaport is concept for environmentally sound port, which directs the development of port to be useful, and environmentally (Bostjan dan Franka, 2014). The management priority shall take for environmental sustainability, energy efficiency and reduce the impact to marine ecosystems and coastal areas.

## **2. RELATED STUDIES**

A study by Michele et al. (2014) states the port needs for energy analysis that shall be divided into two main sectors, namely power plants as an energy supply, and energy consumption as energy demand. Studies made in the case of a structured, divided into four sub system categories i.e. port background and history, energy supply, energy consumption, and approach to the port authorities in managing energy and other major issues. Port activity in sustainability perception shall take into account on human dimensional as the key and important role than energy wise. Health, safety, security and environmental as part of exploring other than above mentioned dimension will enable port function more empowering by participating of community activity who leaving in the port perimeter. This research has involving community perception to strengthen role of ferry port to enable port management formulated new strategy and concept for port development.

Giulia and Raimonds (2013) examines the concept of innovation seaports through the approach of the commercialization of the private sector by providing motivation and stimulus revenues or operational costs reduction, public innovation to motivate the achievement by increasing of social and economic welfare through two methods i.e, distinguishing between methods commercial innovation and innovative methods to look improved the port performance. Methods innovations identified through the dominant component such as the technological aspects, organizational, managerial, and cultural or policies, without neglecting any other aspects of innovation. Indonesia ferry port by having passenger flow peak typical at long week end and annual Muslim's feast shall be had response specifically by local government and port operator to enable reduce stagnation of vehicle and motorcycle at entry point to ferry port area. Some of breakthrough has been applied such open several ticket counter mile away from port gate in respect of responses of health issue due to their fatigueness.

Stefano et al. (2009b) on Life Cycle Assessment (LCA) of waste produced by ships in port Luka Koper sea adriatik, stated that a functional methodology to perform scalable performance of a product system. It has been used as a reference unit in the assessment of various types of waste collected and environmental managed at the port. Restrictions system is carried out to determine the unit input and output processes which has been modeled such solid waste unit collecting, separation unit, wastewater treatment plants, solid waste disposal, incinerators, the use of waste as a secondary fuel, the determination of the sources of waste and the quality of data collected. At the time being, ferry port in Indonesia has very aware on environmental management system. There has managed waste and garbage according to characteristic up collecting and treated by legal processor. Environmental noted is controllable with very minor issue none of discharge to water and air pollution. Presently, environmental concerned in ferry port as mainly of waste management that produced from ship which has received at onshore facility.

Mari and Joaquim (2004) analysis of the history of accidents at sea ports, explain the distribution and variety of accidents from subsequent time, categorization of accident type, location or activity in which the accident occurs, transport, loading and unloading, warehouse sequential. The cause of the accident, such as mechanical failure, the failure of impact, human factor, instrumental failures, service failures, and affected populations by the scale of the consequences of accidents number of fatalities, number of people injured and number of people evacuated was also analyzed. Fatal accident occurrence that may lead to people and property damage were quietly very minor in ferry port operation. However, safety control measures such grab coin attraction by illegal community around ferry port which freely prior ferry departure still become another issue that needs for resolved which can be affected on HSSE port performance. The situation must have taken into ferry operation management responsibility and incident recorded in the event some of them was getting unexpected and the worst case if they are exhausted get into and trapped at vessel propeller.

Jafar and Rezaee (2014) concerning the sea container port in the Persian Gulf who did the rating by steps using two different methods namely TOPSIS technique (Technique for Orders Reference by Similarity to Ideal Solution) and AHP (Analytic Hierarchy Process). TOPSIS analysis showed that the working time, the rate of loading and unloading, safety, the gateway port, the design, the capacity of the port facilities, operating costs, the number of berths, and international policy plays a key role in the success of the port. AHP analysis showed that shipping companies prefer to have container ships rather than other. Ferry port terminal would have different perception in the event approached with above method. HSSE more feasible for the application, cause of having under government safety law that all people and operation have to take the first priority for proper implementation.

Van et al. (2008) mentioned the practical guidance and management of noise mapping in the port area operations has proven to be an instrument valuable to enable port managers develops program and policy. It is not only to assess the disruptions at the port, but also to examine the potential impacts of future development plans for port itself and the area surroundings. Port development, for better control of operations, planning optimization port area, improving the quality of environment around the port, and increasing transparency, it will provide greater potential accepted by the community in order to meet the needs of port development and other industrial activities. Additional instruments, namely the working environment should be an increase for awareness of the dimensions of health and safety among workers. Review on ferry port operation, the population growth as surrounded has significantly increased. The majority of ferry port community has relied on their live to ferry operation activity. Sometimes they work on contractual and daily work basis acted as a porter, berth operational operator, seller snack and meals at onshore area and onboard of vessel, even had for dangerous work attractor that people call ‘coin grasp’. They are swum to collect coin which throw away by passenger before ferry was leaving the jetty. This point of view actual condition of ferry operation will take different dimension to ferry port related to HSSE sustainability in respect of socio economic for community rather than European research compared with Indonesia that will give different spectrum.

Research by the National Institute of Research Development for Marine Geology and Geoecology Romania (2012), raised that the key issues environmental surfaced at public ports are included the quality of the water in the harbor, water disposal, air quality including asbestos, domestic garbage’s including electrical and electronic equipment waste, dredging, noise, energy efficiency, contamination of soil, bunkering, cargo handling, transport and storage, bio diversify and drinking water supply. The study states one of the principal concerned is the discrepancy between managerial responsibility over the environmental aspects of components and the port authority. Therefore, implemented amongst proper infrastructure, superstructure of port management, store operations management and handling dry bulk cargo, liquid bulk, Ro-Ro cargo, passenger traffic, and management of environmental protection is very important. Organizations need to manage the storage and distribution of dry bulk cargoes, fire protection and rescue teams, port security task force, and the laboratory environment directorate. In the ferry port activity, the most priority related to above research concerned is passenger and vehicle traffic arrangement, especially during long week end and Muslim’s feast period. Health cases had noted and treated by health port facility with several of diseases diagnostic i.e.: Myalgia-fatigue, upper respiratory tract infection and respiratory, other diseases such sprain, gastritis and dyspepsia.

Darbra et al. (2004) of the self diagnosis method as a new methodology assessment of environmental management in sea ports. It has been used as a tool for reviewing the performance of the environmental management at seaports, with a design using a practical approach and a process of trial and error that are applied in a number of ports. It can be used and guidelines by environment managers harbor without difficulty in the such cases area for context assessment and environmental management ports, periodic evaluations as independently towards environmental ports improvements, check for compliance with environmental legislation, comparing the effectiveness environmental performance of the port against the criteria of European standards, quality monitoring environmental management result, identifying activities relevant to the strengths, weaknesses, opportunities, threats and environmental management gaps, identify business risks, and motivate the port authorities towards improved environmental management and increasing environmental awareness for the port staff. Performance monitoring on above research are widely have with such parameter related to infrastructure, legislation compliance and conceptual port development. Ferry port terminal can identify for further development by empowering existing resources from local government, operator, community that may lead ferry operation more attractive as magnet business by all involved parties. HSSE aspect are rarely used as basis of performance evaluation at ferry port rather than commercial and operational aspect. It has extensively apply in oil and gas, petrochemicals and mining industry. This implementation newly aspect on HSSE will get different feedback that other approached concept.

Darbra et al. (2009) regarding survey on environmental monitoring requirements of European ports, conducted in several European ports to the characterization, profiles, environmental management activities, environmental needs and monitoring practices. This study reflects the diversity of the environmental performance in European port which showed that most of the publicly ports located in the estuary and river, the type of general cargo is the most popular commodity to be handled at ports, and mostly, port had a comprehensively and established of environmental policy. Half of them has been accredited by external parties. The main parameters of the port environment required are monitored marine related issues i.e. currents, waves and tides, water quality, meteorological parameters, turbidity and sedimentation processes. In general such research data produced from in situ information and some of them extracted using remote sensing data or from aircraft sensors, the rest using computer modeling. Above research methodology related environmetal port requiring as majority refer to marine part area. Whereas, in this researcher context is led with onshore activity related HSSE dimension by major supporting from community activity, passenger behavior and regulation implementation by ferry port operation. The analysis result from trend, perception and response on subject research is then mapped into quadrant priority to be allowed a decision policy maker to develop adequate output as effectively.

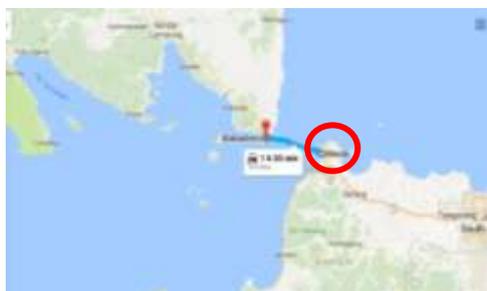
Peris et al. (2005) on the development systems indicators for sustainable port management in the European region by build up implementation base of Environmental Management Systems (EMS). There has composed of an indicator system and used by port authority to run activity at its surrounded. All activities carried out in the port area is analyzed from potential environmental impacts and risks through a multi criteria analysis techniques as a means to identify and evaluate impact of influential factors. Sustainable indicator factor on above research is distinguished with core value context on this research. In the view, HSSE as the pillar of sustainability are used as basis to construct ferry port operation indicator. It can be reflected by cases or impact of HSSE into under performance, it may take resume that affected to ferry port operation thoroughly. Reviewing on the analysis data reflected that health cases that handled and treat by health port officer as a leading dimension than other constructed variables in this research.

Darbra et al. (2005) concerning a procedure for identifying a significance factor of environmental aspects at seaports through a methodology that can identify and ranked the important environmental aspects. The research objective is to assist port managers in identifying significant environmental aspects and strengthen awareness in how to manage environmental. The methods were developed through tightly cooperation with the environmental port manager, who subsequently conducted a trial by using a user friendly method as refer terminology and ISO 14001 requirements. A variety of activities were identified to major ports, as a base line and premise component to be applied in other European ports. In addition, the output is focused on the needs of the instruments preparation to aim environmental management level prepare objective, target and adequate rule implementation. By this research focus on HSSE dimension, means on respective variables have to set applicable target in conjunction with trending cases and port resources availability. Presently, its ferry port has established system and run for couple year since Indonesia colonization era. There is just to align with factual needs, evaluation performance and concerned cases for further operation improvements.

### 3. RESEARCH METHODOLOGY

#### 3.1 Location and Sampling

Research location was conducted at Merak inter island ferry port terminal Indonesia. Geographical coordinate at 5°55'51" S 105°59'43" E. The samples were taken from group main categories of operator and government parties, passengers and community that cohesively involved in ferry port operation. The operator and government parties that worked and positioned surrounded of ferry port terminal are included i.e port operator, stated owned enterprises, port area police sector, vessel owner association of river, lake and inter island transportation, meteorology climatology and geophysics council, navy military police, internal security officer, military police, port authority from government, port authority and inter island crossing, land transportation affairs, companies railway bureau, health affair, and health port officer. Total sampling are applied for 98 respondents using stratified for operator and government body and purposive or judgments sampling for passenger and community. Selected samples then requested to complete a developed questionnaire that had constructed from four main variable of HSSE by supporting from five element of man, money, machine, method, and material. Specifically on passenger samples were taken day and night time respectively in balance, since ferry port activity are covered for a full day operation. The interview were also performed for triangulation to confirm their consistency. Sampling periode was held on period 13<sup>th</sup> May-15<sup>th</sup> August 2016 & during back and return of moslem period of eid feast at H-7 & H+7. This intended to represent and describe of dynamic flow and disparity on ferry port users.



Picture 1: Reserach Location

#### 3.2 Data Processing

SPSS (Statistical Package for Service Solutions) was used for processing the questionnaires and Multi Dimensional Scaling (MDS). The MDS are intended to evaluate, analyze comparative perceptual quality and the expected difference between the groups object. Secondary and primary data's that was obtained quantitative and qualitatively have also carried out to aim and getting an accurate picture of the systematic and relationship between variables through data collection and analysis. The qualitative method acquired through focused interviews, and quantitative are then used to

synthesize the dynamic of ferry ports management principle for Ecoseaport, particularly with regard to Health, Safety, Security and Environmental (HSSE) aspect.

## 4. RESULTS AND DISCUSSION

### 4.1 Results

Refer to quadrant map analysis on configuration of closeness patterns perception amongst involved parties toward constructed variables on HSSE (Health Safety Security and Environmental), S-Stress: 0.04 fair, it can be resumed of grouping perception as follow:

- Group 1 : Military police, community, security officer, navy military, port authority for inter island operator, and police port sector
- Group 2 : Health affair sector, health port affair, passanger and PT. ASDP (private limited of stated owned company)
- Group 3 : Port authority affair and police port
- Group 4 : Meteorology climatology and geophysical council, ship owner association, land transportation affair and company railways bureau

By a distance relative analysis without take into attention of quadrants, it can be concluded that police port sector, and port authority inter island have similiar perception in response HSSE aspect. They emphasized for security concerned throughtout port operation. The mapping result is expected comes an easier for stake holder and regulator to develop policy in regard improving of HSSE aspect in ferry port inter island, especially in developing country in effective manner.

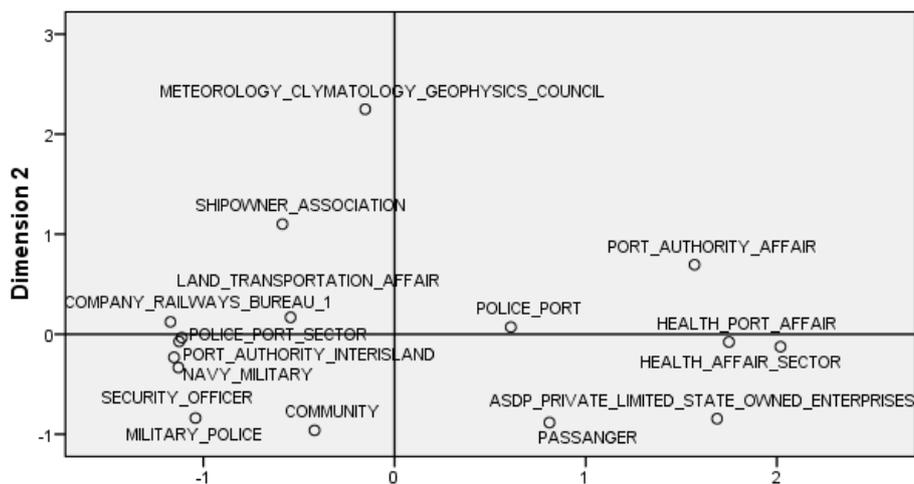


Figure 1: Configuration mapping for constructed dimension, S-stress 0.04-fair

Refer to deep into detail on above figure analysis, most of respondent have a disparity opinion in regard HSSE aspect. Their perception and feedbacks even no overlapped splices and similarity amongst three main constructed group of operator and government parties, passengers and community involved in ferry port operation. This perception is can take into regulator and policy maker in develop policy to improve HSSE performance. However, most of them have noted a similar perception that health and safety aspect shall become priority toward improving Ecoseaport performance concept. They take noted that man and money elements as one characteristics that need improvement. In fact of exploring from interview session, resulted that personal competence and availability in serve of port facility within thoroughly day service shall be ready all the times without giving any delay and barrier of operation. In addition, safe of port is required for investing with some of capital if want to have advance method and facilities. They were addressed and have opinion for high standard of safety would be no meaning without investing of some significant capital and deployed qualified personal. The deficiency on HSSE perception are widely distributed especially among passenger. It can be understood, that level of intellectuality has big spectrum by influenced of their knowledge, education, district origin zone, occupancy etc. However, reflecting on extensively view on this resume, the policy maker and ferry port operator shall take special noted to be allowed and accommodate the various perception on passenger, in order to keep effectively implemented program and regulation based on developed objective and target taken by concerned party.

## 5. CONCLUSION AND SUGGESTION

### a. Conclusion

Reference on data analysis, statistic review and interview, it can be resumed related to stake holder and involved parties in ferry port operation thru Multi-Dimensional Scaling, by using HSSE based concept of sustainability can be concluded that:

1. Policies and regulation in regard arrangements concerned related to number, type and load capacity of operated vessels point of view basis, that may effect on transportation mode, especially in passanger peak during long holiday and annual period of Muslims's feast or eid al-fitr celebration are required a suitable guidelines for proper implementation. Specific managebility technique in face issues and demands of ferry port operation especially in developing of archipelago country have to be put in the first priority such to reduce stagnation and long queue to enter port area.
2. By improved inter-island transport ferry port service, it shall takes comprehensively cooperation amongst such highly influential party's i.e: users, service provider and the government as a regulator. Whereas, each different parties have typical interests and concerned. Ferry port users that have bought a ticket with fixed pricing set by government willing to have affordable service and economic value. They just willing to have that transportation in the point of view with high attention to be a safely, convenient, on time schedule arrival and departure. Service providers as the company that owned ship were trying to fulfill their expectation by following and comply with an approved set regulation by the government, such as tariffs and departures time. Meanwhile, the government as regulator which organized the provision, utilized and support of ferry port inter island to be able fluently, comfortably, run in orderly and keep the security aspect as priority by utilized the components, infrastructure, and resources existing system in optimally manner.
3. Area for improving and maintenance of facilities, infrastructure and existing wharf shall be treated with the maximum lifespan technique to avoid stagnancy and breaking down time during peak period.
4. Perception analysis through Multi Dimensional Scaling, are slightly scattered on HSSE aspect. However, safety and security elements as expressed by policy sector and port authority inter island have put as important dimension in ferry port inter island terminal operation to enable keep sustain for couple upcoming forward generation.
5. Reviewing on HSSE elements in this research. It is explored that actually health issue was predominantly than other. There has indicated and recorded that health cases i.e. outpatient and referral to hospital cases still becomes the main noted at the level of range 300-500 cases fluctuation in every year during peak periods. This shall take priority action to mitigate by optimizing the resources availability and alternate, health facilities, medicines stock and paramedic or doctor on duty are readily within overall day time operations.

### b. Suggestion

Research for sustainability and perception from stake holder, user, community and regulator in ferry port especially in developing archipelago country still needs extend. Currently, the research has apply at onshore facility at ferry port area. It is believing have disparity and differentiate perception in the event locus exploring goes into offshore facility and infrastructure by involving ship management parties as well. Cause of, port activity as one of integration system by the holistic interaction and interdependency in one another can be observed and analyses on leverage and driven factors. Ultimately, developed sustainably program can be able to synchronize among involved parties comprehensively by giving mutual of beneficiary.

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