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The importance of human resources development and its impact in increasing of national port productivity

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Abstract

Problems of Ports in Indonesia are very complex. One of the problems is about Human Resources Development (HRD), which is very fundamental issues that directly affect in many aspects. HRD in quality and quantity aspect has become the vision, listed in the Master Plan of National Ports. One of the most important things is the improvement of human resources of handling equipments, because the technical workers in ports play important roles in determining the productivity. Some sample of ports are taken from secondary data and survey was done in Boombaru Port, Palembang. The majority of workers of containers handling are from non-shipping/maritime school. Then, 80% of training system for new workers is only about on the job training. The training system does not have good structure, which consists of theory and practice of using the equipment. Infact, Boombaru Port in Palembang, operates two container cranes. When loading and unloading, operating processes are conducted by 20 workers, who work together in handling one crane on the ship's dock. About 15 of workers operate equipment for loading and unloading, while the rests supervise the workers. Then, the calculation of the needed workers at the Port to achieve optimal loading and unloading, can be used from the assumed number of workers per gang times number of berth times number of cranes. This paper aims to (1) count the number of workers for Handling Equipment and (2) to plan the development of HR more effectively based on the production of National Ports.

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Keywords: Human Resouces Development; Port; Handling Equipment Workers; Stevedores.

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1. Introduction

Indonesia is the largest archipelago with more than 17,480 islands and as the fourth longest coastal line in the world. It reaches 95,181km wide. Unfortunately, onlyTanjung Priok Port, which was ranked as the world's 100 major seaports according to the American Association of Port Authorities (AAPA) in 2010. The rating is far below Singapore and Malaysia. Major Problems of Human Resources in Indonesian ports currently affect the productivity, and it can be grouped into several things, such as Problem of Stevedoring (Tenaga Kerja Bongkar Muat, TKBM), Issue of Border Limit Permit or Pelanggaran Batas (Lartas), Human Resources Planning, Handling Equipment and the lack of HR competence in complience with job competencies.

Human Resources (HR) development plan of the port become one of the Vision 2030 and the National Port in Indonesia listed in the National Ports Master Plan as follows: (1) The long-term demand (Trade, commodities, transit; Productivity, standard service; and Areaports andterminals) (2) Planning Guidelines (Demand of goods flow,Zoning, supporting infrastructure; (3) Industrial Structure (PPP, Competition; Labour Unions, Stevedore) (4) Human Resources. While Human Resources Development greatly depends on Maritime Education. No matter how great the port, the port industries and handling, they are nothing, if there is no reliable human resources to handle the port. Currently handling equipment and operation technologyis growing rapidly. HR competency in handling utilization will affect the length of dwelling time. HR competency development should always be aligned with the targeted productivity of a port as well as with the equipment owned by the port. Existing maritime education is mostly directed to produce the world sailors, but excluded the subject areas such as: maritime safety, environmental administration, maritime law and policy, port and shipping management, marine environmental and ocean management, and IT system. Further, the training system haven't got good structure that consist of the theory and practice of using the equipment.

From the results of a survey conducted at Boombaru Port (Branch of Pelindo II), Palembang, workers for loading and unloading at the Port mostly have high school education background, which are not Maritime education, and most of them are contracted yearly. Most stevedores said that they are rarely have the training for the development of their work competence, even some of them answered that there are no training for their work in the port.

1.1. Problem Formulation

Based on the background described above, the problems can be formulated as the following:

- How to calculate the number of HR needs of the National Ports?
- How is the education system and the effective training for port workers?

1.2. The aim of the paper

The aims of this paper are

- To count the number of workers for Handling Equipment.
- To plan the system of development of HRD more effectively based on the productivity of Ports.

2. Literature Study

In order to solve the Berth calculation, several steps are needed to estimate Traffic Forcasting, Traffic data cargo volume, commodities and handling equipment.

2.1. Forecasting Principles

Accoding to Thorensen, C (2003), Traffic forecasting requires a combination of commercial and economic knowledge, the mathematical techniques are of minor importance and can often be omitted entirely. Most important thing is to bear in mind that there is very high degree of uncertainty in any forecast and to take steps to minimize the risk. It is the task of the traffic forecaster to provide both a central trend forecast and also a system of watching at given intervals to see when the actual traffic begins to deviate from this forecast.

2.2. *Recording Of Traffic Data-Cargo Volumes*

In order to obtain a general view of the user's need, the recording should be carried out. Evaluate and register the various types of port facilities that exist and identify those that would meet the future requirements (commercial port, bulk-cargo port, industrial port, fishing port, supply port, ferry quays, marina). It needs to register, which of the facilities would be public, and privately owned. The data needed are density and volume/tonnage of good handled in the harbor area. If the type, size, weight and other details of individual consigments are not available, it is necessary to carry out additional recording and research for a limited period of time in order to obtain annual, weekly and daily averages of the port traffic and to identify peaks. This recording, or the more detailed research, must be oriented toward the port plan objectives. The recording of traffic densities and cargo volumes should give a detailed account of cargo and passenger handling by day of week, hour of day, mode of transportation to and from the port for Oceangoing tramp ships, Foreign liner ship, Domestic liner ships, Ferries, Trucks, Buses, Railway and Possibly aircraft.

For the majority of ports, the storage time in the port area is one of the most critical factors in evaluating the port capacity. Today, with faster loading and unloading of ships, it is very seldom the berthing capacity (the number of berth) that reduces the port efficiency. As a rule it is the limitation of the storage area behind the quay, which is determining factor. Roughly, one can say that if the storage time can be halved, the harbor capacity can be doubled. This would ensure the best use of invested capital and would at the same time result in lower cost per ton handled.

2.3. *Regulation and Policy*

According to Middle Term of National Development Plan (RPJMN) 2015-2019, that was published by National Planning and Development Institution (Bappenas), in January 2014, the problem of HR, Technology and Science of Maritime are the quality and quantity aspects of HR; Institution for education and training; lack of innovative research and dissemination; and national maritime paradigm as an archipelago countries. The strategy for improving and strenghtening HR role in Maritime, is to encourage high quality eduction centre services which is balanced with job availability; develop standard of HR competence and sertification sistem; and finally improvement and empowerment of Science Technology, Research and maritime Information system. Based on the basic needs, the development program is arranged in order to develop HR needed, competence standard, and sertification system; to manage services of education centre, and accreditation system; finally to develop Maritime sistem information. Institution of HRD or Badan Pengembangan Sumber Daya Manusia (BPSDM) tried to improve Maritime HR to International Standard, but nowadays Indonesia is lacking of Sailors. Therefore, program of HRD for 2014 having been made with the priority in regulation and institution and also the role of government in developing HR for the developmet of education centre.

3. Methodology

Data collected bycollectingsecondary and primary data. Secondary data collection is done by searchingthe dataat Boombaru Port and desk Study from several articles and annual report of PT. PelindoI, II, III and IV. The secondary data were the subject of analysis are National Ports Productivity Data, Data HR National Ports, Facility and the National Port Equipment, Data management, organizational structure and SOP Ports (samples taken at the Port of Boombaru, Palembang). Analyses were performed by calculation method of Port HR Demands, which calculation is done by using the following formula

$$C = \frac{LxHxWxK}{DxK} \quad (1)$$

Where:

C = the TEU Throughput during the period of Time, L = the number of TEU ground slots, H = the average stacking height in number of containers, W = the average utilization factor for ground Slots, K = the number of days of the period of time, D = the average TEU storage time in days, F = a peaking factor for a combination of higher than average TEU throughput, less than average stacking height and more than average storage time.

CALCULATION OF REQUIRED NUMBER OF BERTHS OF A TERMINAL BOOM BARU

Productivity

Global parameters				
Annual forecasted throughput	Q		3764962	Ton/year
Design Ship capacity	SC		52000	DWT
Non working days per year	do		0	days/year
Number of calls per year	ns	Q/SC	72	calls/year
Berth data				
Mean Crane load/unloading rate	Lc		400	Tons/hour.crane
Number of cranes per berth	nc		1	cranes/berth
Total load/unloading rate berth	Ls	Lc*nc	400	Tons/hour.berth
Ship Service time at berth	ts	SC/Ls	130,00	hours/ship
Available time per berth per year	Tyb	365-do	8760	hours/year.berth
Total Required service time per year	Tu	ns*ts	9412	hours/year
Theoretical nbr of berths			2	
Effective nbr of berths required	nb=N		2	berths
Effective total available time at terminal	Tyt	nbt*Tyb	17520	hours/year
Usage factor	u	Tu/Tyt	0,537	OK
corresponding ratio (tw/ts) = F(N,u) from table	r		0,408	
Average ship waiting time	tw	r*ts	53	hours/ship
Yearly ship waiting time lost	Tw	ns*tw	3842	hours/year
		Tw/24	160	days per year
Cost ship at waiting (non sailing)	Cws		1000	USD/day
Total annual cost waiting time	Cwy	Tw*Cws	0,16	MioUSD
Cost extra berth	Cb		1	MioUSD
One extra berth,with effective nbr of berths	nb=N		3	berths
Effective total available time at terminal	Tyt	nbt*Tyb	26280	hours/year
usage factor	u	Tu/Tyt	0,358	OK
coreesponding ratio (tw/ts) = F(N,u) from table	r		0,057	
Average ship waiting time	tw	r*ts	7	hours/ship
Yearly ship waiting time lost	Tw	ns*tw	537	hours/year
		Tw/24	22	days per year
Cost ship at waiting (non sailing)	Cws		1000	USD/day
Total annual cost waiting time	Cwy	Tw*Cws	0,02	MioUSD/year
Annual saving on ship waiting cost			0,14	MioUSD/year
Eqivalent nbr of berths			0,1	berths

Fig 1: Program of Berth and Crane Calculation based on Productivity

4. Results and Discussion

4.1. Calculation ofHuman Resources needsof Ports

Human resources for loading/unloading of containers or bulk must have skills in operating handling equipment. Infact, Productivity of a port is strongly influenced by the performance of the stevedores, handling equipment operator. Facilities and equipment should be supported by human resources skill. Itwill beuseless if a port has a great container terminalif it is not supported by skillful HR, which might end up with longer loading and unloading process, long queues for mooring boats, and have impact on the ineffectiveness of Berth utilisation. Long Berth will affect the number of ships that could moor and everyship should be served by heavy equipment such as cranes Container, Rail Mounted Gantry Crane (RMGC) to trucks operated by the port workers.

By using the results of calculations, required amount can be calculated by assuming the Port Berth needs of workers unloading at the Port. The calculation using the method Thorensen excel with some parameters that existing the Port. Currently, Boombaru Port Palembang operates two container cranes. Loading and unloading operations were carried out by 20 workers, where about 15 of the workers who operate equipment loading and unloading. Where as, Tanjung Priok port requires about 15 HR for 1 Container Crane. Terminal shifting system of Boombaru Port is is approximately 8 to 12 hours. It is 8 hours for heavy equipment operators as Container Crane, RMGC, Side Loader to Head Truck, and 12 hours for a tool like Reach Stacker and forklift. If viewed from shifting in the Port can be the number of workers that should be required for loading and unloading operations at the ship. It can be assumed that each one Container crane that loading and unloading operation is supported by at least 3 RMGC, 6 Head Truck, Reach Stacker 1-2, 1 Side Loader, Forklift 1-2, 2 whiskey officers and their respective solo, 1 person on board and on the Berth and 2 officers Control Tower. So about 20 workers are needed for every 1 Container Crane. But, it can be changed respectively according to the ability of the Port. So, if at the Port of Boombaru Palembang has 2 Container Crane then at least it needs about 40 people per 1 shift. The working system in Boombaru port is 3 shifts/day or 8 hours/shift. From the survey results, there are as many as 117 loading/unloading

workers at Boomboom and divided into 4 groups. The amount is not sufficient for operation if two ships simultaneously mooring and unloading at the Berth. If it takes 40 people/ shift then at Boombaru, it will take at least 120 people for 3 Shift/day.

For Tanjung Priok Port, the number of handling workers per gang, is about 15 people, fewer than Boombaru Port, Palembang. From this difference it can be concluded that the more sophisticated equipment owned by a port then the less amount of human resources required for loading/unloading. Work management and adjustments of shifting system for the handling activities at the Port should be regulated in order to be more optimal and effective. From the example of the calculation of HR at the Port of Tanjung Priok and Boombaru and it can be assumed for other ports calculations.

There are about 1240 Ports in Indonesia, which consists of 988 Port of Class III, Class II 217 Ports, 31 Port Class I and four Main Ports. There are some Ports, that become centers of main bulk container in Indonesia. This study, has calculated some of the ports that their parameters are obtained through the survey data directly to Tanjung Priok, Jakarta and Boombaru Port, Palembang, as well as some other ports the data obtained from the results of desk study. For the Port of class III in the table, HR are not calculated assuming the needs for human resource have not handling tool. The calculation assumptions HR needs for handling equipment in major Container Port in Indonesia such as in the following table. Furthermore, a rough calculation based on the further assumption is the multiplication of the number of ports perkelasnya each multiplied by the number of digits required human resources according to the figures below Piers productivity to be achieved.

Table 1: Estimation needs for Loading and unloading HR of sample Ports

Name of Ports	Locations	No of Cranes	Stevedore needs	Total
Container Terminal Koja, Tanjung Priok	Jakarta	7	7 x 15 x 3	315
Jakarta International Container Terminal (JICT)	Jakarta	21	21 x 15 x 3	954*
Boombaru, Palembang	Palembang	2	2 x 20 x 3	120
Makassar Port, Terminal Bung Hatta	Makassar	2	2 x 20 x 3	120
Dumai Port	Dumai	3	3 x 20 x 3	180
Belawan International Container Terminal (BICT)	Medan	11	11 x 15 x 3	495*
Container Terminal Surabaya	Surabaya	11	11 x 15 x 3	495*
Container Terminal Semarang	Semarang	5	5 x 20 x 3	300

*1): the results of calculationsbased onthe productivity ofeachassumingidealwaiting time of6hours.

The above table shows the calculation of HR needs for handling operation for each class of the Ports. Basically, the more sophisticated handling equipments, the more competent the operators, but the less number operator needs are needed. In the above calculation, Port of Tanjung Priok main classes, needed 15 labour for 1 gang work. Boombaru which has one class under Tanjung Priok port needed 20 people for 1 gang. Even for such a world-classport as Antwerp, which has joint operation with Port of Singapore Authority (PSA), have 8 people pergang. Obviously the amount of human resources is not absolute and can relatively be changed according to the plan of each port.

Table2: Total HR Needs for Handling Operation in Indonesian Ports

No	Classification of Ports	No. of HR**)	No. of Ports *)	Total No. Of HR
1.	Class of Main Ports	954	4	3816
2.	First Class of Ports	300	31	9300
2.	Second Class of Ports	120	217	26.040
3.	Third Class of Ports	NA	988	NA
TOTAL				39.156

The following table 3 is the calculation of Human Resources Need of Indonesian Ports, that is based on Productivity.

Table3 : Human Resources Need of Indonesian Ports based on Productivity

Classification of Ports	Total Needs of Human Resources		
	HR of Handling Operator	HR of Shipping	HR of logistic
Class of Main Ports	3816	1060	688
First Class of Ports	9300	2046	1798
Second Class of Ports	26040	4123	10416
Third Class of Ports	N/A	N/A	N/A
Total	39.156	7.229	12902

This calculation of HR needs are not included the needs for sailors, which is according to BPSDMP about 43,806 sailors, among others are 18,744 naval official (army). While according to data of The Baltic and International Maritime Council (BIMCO), in December 2010, currently, number of Sailors inn Indonesia is about 338,224 people, that is about 77,279 work abroad.

4.2 Plan of the educationsystemandeffective training

International standard of education quality refer to the amendments of STCW 1995 based on Manila Convention, 2010 refer to zero accident. This requires continous improvment in education system, examination and certification. Nasional standard of education system and maritime training is based on decree three minister. regarding Quality Standard System, 2003. While, formal education has not yet got the standard. Regulation needed for certification are presented in the following figure.

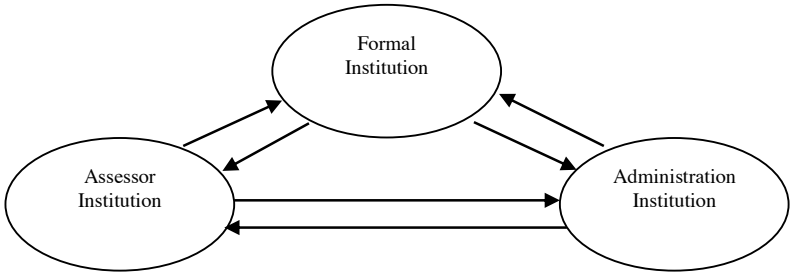

Fig 2: Development System of Education and Certification

For mapping the development of Human Resources of Indonesian Ports, a Roadmap has been arranged as the following table 4.

Table4: Roadmap of Maritime Human Resources Development

Preparation of Substance of Regulation as a Foundation of HR Development 2015-2016	Preparation of Institution for producing Human Resources in Maritime 2017-2020	Development and implementation of Improved Services of Indonesian Port system 2020 – 2030
• National Workshop or FGD regarding HRD with stakeholders. • Discussion regarding Regulation of Institution System and Dissemination of Roadmap HRD Ports • Focus Group Discussion regarding HRD in vocational education • Start Establishing Maritime Education as needed • Recruitment of HR Instructors/ Lecturers and plan for improving their competence (S1, S2, S3) • Disseminationof Mapping Results of HR to stakeholders	• Evaluation andImprovement of eduction packages of Maritime Ports, which is still nonexistent • Establish HRD through vocational education • Establishing Maritime Education as needed • Recruitment of HR to develop competence (S1, S2, S3)	• Developing and updating database characteristics of HR of Maritime Porst Services. • Developing Indonesian Port System by strenghtening and improving HR capacity • Strenghtening of Port Institution • Improving value added function and services of Indonesian Ports.

5.Conclusion

From the discussion in the previous sectionsconclusions can be drawned as the following:

(1) The HR needs are obtained from the calculation of the number of Berth and Cranes, which are calculated with Thorensen formula based on the productivity of Ports. Then the number of Human Resources needed according to types of cranes are generalized and assumed based on the groups of Ports in Indonesia, so that the number of workers for Handling Equipment can be obtained 39,156 people, which is the highest number needed for HR development. The number of Human Resources needed for logictics are about 12,902 people and for shipping are about 7,229 people

(2) Education system and effective training for port workers are planned according to the HR Development. Regulation needed for certification consists of three element, namely legal institution, assessor, institution of administration certification. Roadmap for HRD is divided by three periods, namely: Preparation of Substance of Regulation as a Foundation of HR Development (2015-2016);
Preparation of Institution for producing Human Resources in Maritime (2017-2020); and Development and implementation of Improved Services of Indonesian Portsystem (2020 – 2030).

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