Original Article

Port Human Resources Readiness in Facing the Digital Era and Global Trade at Soekarno Hatta Port Makassar

Rosnani[1*], Baharuddin Hamzah[2], Muh. Saleh S. Ali[3], M. Rijal Idrus[4]

[1]*Doctoral Program in Development Studies, Postgraduate School, Hasanuddin University, Makassar, Indonesia.*
[2]*Development of Architectural Faculty of Engineering, Hasanuddin University, Makassar, Indonesia.*
[3]*Department of Agricultural Socio-Economic, Faculty of Agriculture, Hasanuddin University, Makassar, Indonesia.*
[4]*Hasanuddin Centre of Excellence for Climate Change Studies, Hasanuddin University, Makassar, Indonesia.*

[1]*Corresponding Author : rosnaniziniichi@gmail.com*

Abstract - The digital era and global trade have significantly changed various sectors, including the port sector. Soekarno-Hatta Port of Makassar, as one of the main ports in Indonesia, began to implement digitalization in ship and goods services, so it faces challenges in facing this change, namely related to the readiness of human resources to face new ways of working in the digital era. This study aims to analyze the relationship between the readiness of port human resources to face the digital era and global trade at Soekarno-Hatta Port, Makassar. The quality of human resources in the port context is crucial for ensuring efficient and effective port operations supporting regional and national economic growth. The research employed quantitative methods, specifically percentage analysis and descriptive statistics. Questionnaires were distributed to 53 respondents, and the results were analyzed using descriptive statistics. The findings indicate a significant relationship between the readiness of port human resources and their ability to face the digital era and global trade at Soekarno-Hatta Port, Makassar. High-quality port human resources with strong digital readiness positively influence the speed and efficiency of services, including loading and unloading activities, mooring/berthing services, and other operational activities related to ships and goods at the port. Therefore, training and skills development in digital-based services are essential. Additionally, strengthening cooperation with industry and educational institutions is necessary to develop relevant competencies and training programs tailored to the needs of the port industry.

Keywords - Readiness, Port human resources, Digital era, Global trade, Hatta port.

1. Introduction

Digitalization of ports is inevitable and can contribute to improving the efficiency and reliability of their operations [1], [2], [3], [4]. Smart ports can be considered as a solution that addresses the new challenges faced by logistics systems and international trade [5]. However, Indonesian ports face various challenges in digital transformation, such as the adoption and integration of technology across their vast port network and the quantity and quality of human resources [6], [7]. Human Resources (HR) who have the readiness to work with the ability to use technology are still very limited [8].

Digital transformation in the port sector includes the application of information technology-based management systems, the use of automation tools, and integration with global logistics networks, and this intelligent system can be understood as a system that uses a combination of human-based processes supported by real-time data from actors and sensors [9]. In this context, HR readiness is a key factor that determines the effectiveness and efficiency of port operations [10]. Technology, data, human capital, processes, and organizational structure are key drivers of transformation, each playing an important and complementary role [11]. Based on Article 1 of Law [12] concerning shipping, a port is a place for loading and unloading goods and disembarking and boarding passengers. The port has certain boundaries covering land and waters and is equipped with facilities for safety and security.

The port sector encompasses a wide range of services, with freight and passenger transportation being the primary ones. Other related services include various port operations, such as pilotage assistance, towing and tug services, emergency repairs, berthing and anchoring, as well as complementary or supporting services such as storage and warehousing, maritime cargo handling, and customs services [13], [14]. Ports have become crucial nodes in complex logistics chains, with the primary goal of enhancing product competitiveness. The services provided by port businesses are vital, as they significantly impact the final pricing of products [15].

In the current era of trade globalization, ports, which are the gateway to trade, have to implement digitalization. Digital transformation of ports requires substantial investment [16]. Digital transformation can improve the competitiveness and resilience of port operations by coordinating human resources, information, and technology [17].

In Industry 4.0, human resources are crucial because this industrial revolution redefines the concept of work [18], [19]. Human resources involved in modern processes must be trained to work with both software and hardware [20]. The quality of human resources at a port, which serves as a gateway for trade, can significantly influence the efficiency of services such as loading and unloading activities, mooring/docking services, and document management for ship clearance in and out. While these services are supported by technology, such as Inaportnet [21], human labor is still essential. Efficient technology integration requires competent human resources [22].

Indicators of port human resource readiness in the digital era and global trade are the availability of human resources and experts in their fields in terms of experience, education and training so that they can find an overview of the obstacles and challenges of change regarding port human resource readiness.

Makassar Soekarno-Hatta Port, as one of the main sub-logistics in eastern Indonesia, has its challenges in facing this change, namely related to the readiness of human resources to face new ways of working in the digital era. This research focuses on the readiness of human resources at the port, identifying the competencies and training needed so that it can find out an overview of the obstacles and challenges of change regarding the readiness of port human resources in facing the digital era and global trade at Soekarno Hatta Port Makassar.

2. Methods
2.1. Research Variables
The research focuses on six dimensions of HR readiness: competency readiness, personal readiness, team readiness, readiness in technological/digitalization aspects, digital-based service readiness, and readiness in education and training.

2.2. Data Collection Techniques and Samples
This research uses a quantitative descriptive approach by collecting data through observation, questionnaires and interviews. The sample in this study consisted of sea transportation human resources/employees who were directly involved in ship services and cargo services at the port, as well as operators and users at the Port of Makassar, with a total sample of 53 respondents through proportional random sampling. Proportional random sampling is used because sea transportation human resources at Makassar Port consist of various levels of education, namely Senior High School, Diploma III, Diploma IV, Strata One (S1), Magister (S2), and Doctor (S3).

2.3. Data Analysis Techniques
Descriptive research data analysis techniques are carried out through frequency distribution with data percentage techniques. The percentage result criteria consist of very good / always (81.25-100%), good / enough / always (62.50-81.24%), moderate/moderate/rarely (43.75-62.40%), less / never /low (25-43.74%). In addition, parametric statistics are also used with product moment correlation to find the magnitude of the relationship (correlation) of variable X (HR readiness) to Y (digital era) [23]

2.3.1. Assumption Test Data
Normality Test
Normality testing is based on the assumption that if the significant value is greater than α (Sig> α), then the distribution is normal [38]

Linearity Test
The linearity test is conducted to determine whether the independent variable has a linear relationship with the dependent variable. Linearity testing is based on the assumption that significance is less than 0.05 ($P < 0.05$), and this shows a linear relationship.

Simultaneous Regression Test
A simultaneous regression test determines whether the X variable is significant or insignificant to the dependent variable (Y).

Hypothesis Test
The data analysis technique of data analysis is to determine whether the dependent variable is significant or insignificant. Hypothesis Test The data analysis technique used to test the research hypothesis is parametric statistics with product-moment correlation analysis.

The hypothesis can be tested using the assumption that if the probability (Sig) < α, then the hypothesis can be accepted [38].

3. Results and Discussion
3.1. Results
The development of maritime trade has led to efforts to improve loading performance, increase productivity, and reduce the time and cost of each activity through automated handling units [24]. In Indonesia, the *Inaportnet* system was developed, and its operational effectiveness is significantly influenced by the quality of human resources [25].

The quality of port human resources affects the efficiency of services such as loading and unloading, mooring, and processing documents such as ship clearances. However, the availability of skilled human resources for port services in Indonesia, especially in the digitalization era, remains limited [26], [27], [28]. Inaportnet is a smart port system, an open and

neutral electronic portal that facilitates the quick, safe, and integrated exchange of port service data and information among relevant government agencies, port business entities, and logistics industry players [2], [29]. Ports have also implemented an online system for managing delivery orders (DOs). For example, port operators like Pelindo have begun digitizing operations across several port services.

3.2. HR Readiness Aspects
3.2.1. Competency Readiness Aspect

Competence is the skills, knowledge, and expertise possessed by employees. Competencies include training, qualifications, and the ability to perform tasks efficiently [30]. The following table shows an overview of HR competency readiness at the port.

Table 1. Competency readiness

No.	Statements	Respondent's answer level								Categories
		1		2		3		4		
		F	%	F	%	F	%	F	%	
1.	I understand everything related to my job.			8	15%	11	21%	34	64%	Good
2.	I am constantly seeking to learn various aspects of my work.					12	23%	41	77%	Good
3.	I can carry out all the tasks in my job.			1	2%	14	26%	38	72 %	Good
4.	I rarely make mistakes in my work.			4	8%	13	24%	36	68 %	Good
5.	I enjoy doing my job.					10	19%	43	81%	Good
6.	I always work by existing procedures.			5	9%	11	21%	37	70%	Good
	Average % Value								72%	Good

Source: Results of data analysis, 2023

Based on Table 1, the frequency distribution table of HR competency readiness items, in terms of the item "understanding the work being pursued, out of the 53 respondents, around 64% or 34 people who chose the answer understood the work being pursued well and around 15% or 8 people who answered quite understood, with their respective fields.

3.2.2. Aspects of Technology Readiness

A digitally-ready business not only has the technological infrastructure in place) but also fosters a culture of innovation, transformation, and agility.

This maintains a workforce with the various skills, knowledge, and competencies needed to navigate the digital landscape and embrace emerging technologies [31].

The following is an overview of the technological readiness aspects of Port Human Resources. Based on Table 2, the frequency distribution table of technology readiness items,

in terms of the item "able to operate a computer properly, out of 53 training respondents, about 75% or 40 people who chose the answer were able to operate a computer properly and about 12% or 6 people who answered were quite capable in operating a computer, the related applications in this case, and among the 5 (five) statement items, there was 1 (one) statement following training on digital technology, from the results of the respondents' answers, around 36% or 19 people who understood digital technology well and 14 people who stated that they understood digital technology well enough, and there were 7 respondents who chose statements that did not understand digital technology.

3.2.3. Aspects of Personal Readiness

Personal readiness is a necessary component that often determines the efficiency and success of an activity. Personal readiness is one of the typical psychological conditions of the subject of the activity [32]. Personal readiness is needed by HR to be able to do the assigned tasks. The following is an overview of the personal readiness of HR at the port.

Table 2. Technology readiness

No.	Statements	Respondent's Answer Level								Categories
		1		2		3		4		
		F	F	F	%	F	%	F	%	
1.	I can operate a computer well.			6	12%	7	13 %	40	75%	Good
2.	I can operate my smartphone well.					4	8%	49	92%	Excellent
3.	I can operate various applications related to my work well	7	13%	9	17%	13	25%	24	45%	Fair
4.	I keep trying to understand more about digital technology.			5	9%	21	40%	27	51%	Fair
5.	I often attend trainings to better understand digital technology	7	13%	14	26%	19	36%	13	25%	Less
	Average % Value								58%	Fair

Source: Results of data analysis, 2023

Table 3. Personal readiness

No.	Statements	Respondent's Answer Level								Categories
		1		2		3		4		
		F	F	F	%	F	%	F	%	
1.	I am confident that I can solve all the problems I encounter while doing my work.			8	15%	16	30%	29	55%	Fair
2.	I am confident that I can work better in the future.					11	21%	42	79%	Good
3.	I do not feel pressured or stressed in carrying out my work.			7	13%	7	13%	39	74%	Good
4.	I feel that my job has bright prospects in the future.			1	2%	19	36%	33	62%	Good
5.	I can make ends meet from my work	2	3%	10	19%	12	23%	29	55%	Fair
6	I can be the best compared to others with the same job.			5	9%	21	40%	27	51%	Fair
	Average % value								63 %	Good

Source: Results of data analysis, 2023

Based on the data in Table 3 above, related to personal readiness on the statement item about being able to overcome problems at work, there are around 55% or 29 respondents and around 15% are less able to overcome problems at work, from the average results of the respondents' answers in percentage terms, are in the category quite in accordance with the highest percentage value of the criteria. While for the statement item about being able to work well, not feeling pressured/stressed in carrying out work and having prospects of the three bright in the future, from the three statements, the average respondent's answer is in a good category, according to the average percentage value of 63%.

3.2.4. Teamwork Readiness Aspect

One of the factors in completing a job is the implementation of work in a team [33]. Teamwork influences organizational commitment {34]. The following table shows an overview of the readiness of Teamwork for HR at the port.

Table 4. Teamwork readiness

No.	Statements	Respondent's Answer Level								Categories
		1		2		3		4		
		F	F	F	%	F	%	F	%	
1.	I can cooperate with others.					9	17%	44	83%	Excellent
2.	I often cooperate with others.					16	30%	37	70%	Good
3.	I enjoy cooperating with others.					18	34%	35	66%	Good
4.	I am active in activities in my neighbourhood.			3	5%	21	40%	29	55%	Fair
5.	I feel that by working in a team, I will be able to achieve better results in my work.					11	21%	42	79%	Good
6	I actively participate in organizational activities in my workplace.			4	8%	16	30%	33	62%	Good
	Average % Value								69%	Good

Source: Results of data analysis, 2023

In accordance with the data in Table 4, an overview of HR readiness regarding teamwork readiness, from 6 statement items, there are the results of respondents' answers to active statements in the neighbourhood; the average respondent's answer is in the appropriate category with the highest percentage value of 55%, while for other statement items the average respondent's answer value is in the good category or around 69% and for statement items about being able to work with others is in the very good category or from the results of the average respondent's answer of around 83% the highest percentage value or there were 44 respondents out of a total of 53 respondents who chose the category very well in working with others.

3.2.5. Aspects of HR Readiness in the Digital Era

Organizations depend on digital readiness, as it determines the actual use and acceptance of digitalization by individuals [35]. Digital competence has a positive and significant effect on organizational performance [36] table 5.

The following shows an overview of HR readiness related to services in the digital era.

Table 5. HR readiness related to services in the digital era

No.	Statements	Respondent's Answer Level								Categories
		d/1		c/2		b/3		a/4		
		F	%	F	%	F	%	F	%	
1.	Familiar with the concept of digitalization of digital-based services in the port sea transportation industry today.			5	10%	17	32%	31	58%	Fair

2.	Implement digital-based service technology solutions in operational services at the port.		11	20%	15	28%	27	51%	Fair
3.	Integrating information systems in digital-based services within the scope of ship and goods services at the Port		9	17%	23	43.4%	21	39.6%	Less
4.	The level of skills/expertise you have now is competent and adaptable in the digital era in the sea transportation industry:		11	20.7%	19	35.8%	23	43.4%	Fair
5.	Your response about information technology training in digital-based services at the Port		21	39.6%	17	32%	15	28.3%	Less
Value % Average								44%	Fair

Source: Results of data analysis, 2023

Based on readiness table 5 in the aspect of digital-based services from existing data, the lowest percentage value is related to information technology training in digital-based services, around 28.3% in the insufficient category and the highest percentage value of 58% in the sufficient category related to items familiar with the current concept of digitization at the port. Related to this, indicators related to the existence of digitalization training at the port are also still at a lesser level, so of all the existing items related to HR readiness in digital era-based services are at an average percentage value of around 44% at the sufficient category level, so that more efforts need to be made and get support from leaders such as participating in training activities related to various technologies in operational activities at the port related to ship and goods services. Organizations at the Port are integrated and directly involved (such as authorities, operators, and customs).

They integrate the system (information) built together to achieve better communication. There is a single digitalization environment with a small scale in each agency/institution that has been created by getting several benefits such as better coordination, time reduction, and efficiency can be achieved.

The port digitalization environment is starting to be felt by various stakeholders at the port.

3.2.6. Readiness of HR Related to Education and Training

The demands of Revolution 4.0 require the implementation of up-skilling or reskilling programs for workers [14]. Soft skills training has a significant effect on employee readiness for change transformation [37].

Table 6 is an overview of HR education and training at the port.

Table 6. Readiness of HR related to education and training

No.	Statements	Respondent's Answer Level								Categories
		d/1		c/2		b/3		a4		
		F	%	F	%	F	%	F	%	
1	Provide technology and digitization-related training to employees in the context of sea transportation/porting.			14	26.4%	21	39.6%	18	34%	Less
2	The training provided can improve digital skills and understanding of technology in the marine transportation/port industry.			4	8%	23	43.4%	26	49%	Fair
3	Current education and training curricula cover aspects relevant to digitalization in maritime transport/seaports.			13	24.5%	13	24.5%	27	51%	Fair
4	The most influential factors regarding the quality and readiness of port human resources in facing the digital era and global trade.			6	11.3%	23	43.4%	24	45%	Fair
5.	Improving the current educational qualifications/competencies is very important and needed in accordance with the field of expertise in the maritime transportation industry.			5	9.4%	12	22.6%	36	68%	Good
Average % Value								49.5%	Fair	

Source: Results of data analysis, 2023

Based on the table above, a description of the readiness of HR related to education and training, the average choice of respondents' answers to each statement item is around 49.5%, the percentage of respondents' answers is in the sufficient category, in accordance with the standard descriptive analysis criteria for percentages between 43.75% - 62.40%, the criteria are sufficient [23]. Soekarno Hatta Port Makassar is fairly ready in terms of port human resource education and training. With continuous investment in education and training, the port

can face future operational challenges and technological adaptations, which are important to maintain and improve port efficiency and productivity, there needs to be continuous efforts in aligning training methods with the latest industry and technological developments, as well as increased cooperation with international education and certification institutions to ensure that port human resources remain competitive in the global market.

3.3. Discussion

Based on the discussion above, it can be concluded that while the readiness of human resources at Soekarno-Hatta Port Makassar is relatively good, there are still areas that require improvement to effectively and efficiently navigate the digital era and global trade. The interviews revealed that although there is awareness of the importance of digitization among the workforce, the readiness of human resources at Soekarno-Hatta Port Makassar still needs enhancement in training and technological infrastructure. Challenges such as resistance to change and limited infrastructure must be addressed. Continuous training, improvements in technology infrastructure, and strong management support are crucial for successfully adapting to the digital era at this port.

3.3.1. The Influence of the Readiness of Port Human Resources to Face the Digital Era and Global Trade at Soekarno Hatta Port Makassar

HR readiness with sub-variables, including competency readiness, personal readiness, readiness to work in teams, and readiness in technological / digitalization aspects, affects ship and goods services in the digital era and global trade at Soekarno Hatta Port Makassar and has an impact on service speed in the loading and unloading process, mooring / berthing services, and processing ship and goods documents at the port. The hypothesis can be tested using the assumption that if the probability < α then the hypothesis can be accepted. The test results obtained a value of 0.000; this value is smaller than the α value of 0.05, or in other words, the probability is smaller than α (probability 0.000 < 0.05). Thus, HR Readiness has a positive and significant influence on the digital era and global trade at Soekarno Hatta Port Makassar.

The results of the analysis obtained an R of 0.564, which means that 56.4% of the contribution of port human resource readiness is in facing the digital era and global trade at Soekarno Hatta Makassar port. This gives a pattern of understanding that HR readiness influences 56.4% of the digital era and global trade at Soekarno Hatta Makassar port, while the remaining 43.6% is explained by other causes.

While the relationship between HR readiness and supporting factors is 51.1%, the magnitude of the relationship (correlation) of variable X (HR readiness) to Y (digital era) is 51.1%; this shows a strong level of relationship. At the same time, the magnitude of the influence of port HR readiness on the digital era and global trade is 0.564 or 56.4%. This value shows a substantial relationship. The above data can be seen in Table 8 of the Determination coefficient in Table 7.

Table 7. Model summary

Model	R	R Squared	This	Eta Squared
HR Readiness * The digital era	,564	,511	,526	,431

Dependent variable: digital era and global trade
Predictors: (Constant), HR Readiness

Based on the above calculations, the results of the coefficient of determination can be read in the R square value found in the Model Summary output from the value of *R* square or R2 = 0.511, which is 51.1%. The magnitude of the R square value shows that HR readiness and supporting factors together have a fairly strong and positive correlation to the digital era and global trade with a value of 51.1%, or in other words, variable X can affect the digital era by 51.1%.

Table 8. Reliability testing results

Scale	N of Classes	Alpha	N of Items
HR Readiness	53	0.670	21
The digital era	53	0.672	14

Source: Data Processed, 2023

Data Assumption Test Results

After all research data is obtained, data analysis is carried out to test the hypothesis, but previously, it is necessary to test the assumptions of the research data. The required assumption tests are normality test and linearity test.

1. Normality Test

Normality testing is based on the assumption that if the significant value is greater than α (Sig > α), then the distribution is normal [38]. Based on the test results for the HR readiness variable, a significant value of 0.416 is obtained or, in other words, Sig 0.416 > α 0.01, meaning that the data is normally distributed. Meanwhile, for the digital era variable, a significant value of 0.231 is obtained or in other words, Sig 0.231 > α 0.01, meaning that the data is normally distributed.

2. Linearity Test

The linearity test is conducted to determine whether the independent variable has a linear relationship with the dependent variable. Linearity testing is based on the assumption that significance is less than 0.05 (P < 0.05), then this indicates a linear relationship. The linearity test results of the HR readiness variable with the digital era variable obtained a value of 0.000 (Sig 0.000 < α 0.05). This shows that the port HR readiness variable with the digital era and global trade variables has a linear relationship.

3. Simultaneous Regression Test

A simultaneous regression test determines whether the X variable is significant or insignificant to the dependent variable (Y). Based on the available data, it is obtained that the significant value between the HR readiness variables is 0.00 < 0.05, which affects the digital era and global trade, meaning that there is a positive and significant influence together between the readiness of port human resources on services based on the digital era and global trade at Soekarno Hatta Port Makassar.

4. Hypothesis Testing

The results of the assumption test above show that the data collected are eligible to carry out the next analysis, namely

testing the hypothesis. The data analysis technique used to test the research hypothesis is parametric statistics with product-moment correlation analysis. The hypothesis can be tested using the assumption that if the probability (Sig) < α, then the hypothesis can be accepted [38]. The test results obtained a probability value (Sig) of 0.000. This value is smaller when compared to the α value of 0.05, or in other words, the probability (Sig) is smaller α (probability (Sig) 0.000 < α 0.05).

Based on the results of the data analysis carried out, it can be concluded that there is an influence between the readiness of port human resources in facing the digital era and global trade at Soekarno Hatta Port Makassar. This is indicated by a correlation of 0.564 or 56.4 percent with a significant level of P = 0.000 and a relationship of 0.511 or 51.1%. With a significant level of P = 0.000. Thus, it can be said that success in following developments and trends in the digital era also depends on the readiness of its human resources, training and skill development in digital-based services is essential to ensure that the readiness of port human resources can manage and utilize technology effectively in the face of the digital era and global trade at the Makassar Soekarno Hatta port.

Therefore, it is necessary for human resources (HR) to have optimal performance. The quality of port human resources that are ready will impact the speed of providing services in the process of loading and unloading activities, mooring / berthing services, and managing other activities in the operation of ships and goods at the port.

Based on data analysis and the results of interviews with various stakeholders, the following are the main conclusions that can be drawn:

3.3.2. Training and Education

The training provided is quite helpful in improving employee competencies, but more specific and in-depth training models and methods are needed, especially related to information technology, digital-based services, and operational automation in ship and freight services. Training in the digital field is particularly important because digital transformation can be a complicated process when workers do not have adequate skills [39].

3.3.3. Strategy to Improve Port Human Resources Readiness

1) Management and Leadership Support: Visionary leadership and strong management support are essential to drive the digitization process and ensure that employees receive the necessary training and motivation to adapt to the digital era.
2) Training Curriculum Development: Development of curriculum and training methods that focus on digital service skills and modern logistics management. This curriculum should cover technical and practical aspects relevant to ship and freight services and in line with the needs of the port industry.

3) Improving the competence and training of port human resources requires more specific training models and methods that are to the needs of the industry, especially related to digital-based services and operational automation of ship services related to ship berths. (Training in the digital field is very important because digital transformation can be complicated when workers do not have adequate skills.

4. Conclusion

Based on the results of the discussion and data analysis, it can be concluded that the human resources at Soekarno-Hatta Port, Makassar, demonstrate good readiness for the digital era and global trade. This is evident from the average percentage values in the 'good' category across dimensions such as competence, personal readiness, and team readiness. However, readiness in education and training, technological readiness, and adaptation to the digitalization era are, on average, only in the 'sufficient' category. This readiness is uneven, as some human resources still lack understanding and need enhanced competence and training related to port services that align with technological developments in the digital era, particularly regarding ship and goods services. Therefore, it is crucial that leadership provides equal opportunities for competency improvement and training to ensure adaptation to the ongoing digital transformation.

Meanwhile, based on the results of descriptive statistical data and hypothesis testing, port human resources' readiness has a significant influence on their ability to face the digital era and global trade at Soekarno-Hatta Port, Makassar. Thus, it can be concluded that success in adapting to developments and trends in the digital era also depends on the readiness of human resources. Training and skill development in digital-based services are essential to ensure that port human resources can effectively manage and utilize technology in the digital era and global trade at Soekarno-Hatta Port, Makassar.

The readiness of human resources at Soekarno-Hatta Port, Makassar, in facing the digital era and global trade, still faces various challenges, particularly concerning technological competencies and supporting infrastructure. However, with the right strategies-such as improving training methods and collaborating with educational institutions to develop training programs relevant to the needs of the port industry—the quality and readiness of human resources can be enhanced to better face challenges and seize opportunities in the digital era and globalization.

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Author Contributions

Conceptualization: Rosnani
Data curation: Rosnani
Formal analysis: Rosnani , Baharuddin Hamzah, Muh. Saleh S. Ali, and M. Rijal Idrus
Funding acquisition: Rosnani
Research: Rosnani
Methodology: Rosnani , Baharuddin Hamzah, and Muh.

Saleh S. Ali
Project administration: Rosnani
Resources: Rosnani
Supervision: Baharuddin Hamzah, Muh. Saleh S. Ali, and M. Rijal Idrus
Validation: Rosnani
Writing–original draft: Rosanna
Writing–reviewing & editing: Rosnani

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