

Curriculum Relevance and Port Workforce Competencies: a Stakeholder Perspective

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KEYWORDS	ABSTRACT
Keywords: Relevance Curriculum; Human Resource; Port; Digital Era; Competencies Conflict of Interest Statement: The author(s) declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. Copyright © 2026 AMAR. All rights reserved.	Purpose: This study aims to find out how the relevance of courses in the Diploma IV KALK PIP Makassar Program is related to the world of work in the port sector. The location of this research was carried out at PT Pelindo IV. Until now, several alumni have worked at PT Pelindo IV, but due to the rapid development of the company and the increasing number of universities, the competition will be even tighter. Research Design and Methodology: The type used in this study is descriptive with a qualitative approach, the data source is taken through interviews or interviews with informants, the number of informants is determined using purposive sampling techniques, totaling 14 people from the Ministry of Transportation and PT Pelindo IV officials. Findings and Discussion: The results of the study show that there are four groups of port competencies needed by the industry, namely port operations (average 3.36), port engineering (3.19), logistics affairs (3.25), and port management (3.39); 26 out of 27 subcompetencies are considered important to very important. Of the 39 courses, 36 were considered highly relevant (average 3.00-3.50) with character development obtaining the highest score (3.50), while three courses had relatively lower scores (2.88), though still within the relevant category. Implications: In general, the KALK curriculum is relevant to the competency needs of port human resources; However, strengthening the implementation of learning, updating the content of port digitalization, and institutionalizing curriculum review with industry is still needed so that link and match can be realized in a sustainable manner.

Introduction

More than 80% of the world's trade volume is transported by sea, so the smooth global supply chain relies on the performance of the shipping and port industry (UNCTAD, 2024). On the human resources side, BIMCO and the International Chamber of Shipping (2026) noted that the world's commercial fleet of more than 85,000 ships is served by around 2.57 million seafarers, with a projected shortage of tens of thousands of officers by 2030. The need for competent human resources does not only occur on board; Ports as the main node of the logistics system also require professionals in the fields of operations, engineering, logistics, and port management (Notteboom et al., 2022). The efficiency of a port determines the competitiveness of national logistics costs, and that efficiency is ultimately determined by the competence of the people who manage it.

As the largest archipelagic country in the world, Indonesia places the port in a very strategic position in the national transportation and logistics system. Law Number 17 of 2008 concerning Shipping and Government Regulation Number 61 of 2009 concerning Ports affirm the function of ports as a node of transportation networks, economic gateways, and places of modal transfer activities. The institutional dynamics of this sector are also moving fast: since October 1, 2021, four port SOEs—

including PT Pelabuhan Indonesia IV (Persero), which is the locus of this research—have been integrated into PT Pelabuhan Indonesia (Persero). The integration strengthens the demand for standardization of port human resource (HR) competencies nationally, while emphasizing the urgency of questions regarding the readiness of vocational education institutions to supply relevant human resources.

The rapid changes in the strategic environment as a direct result of globalization are inevitable for any type of organization business, public, or social and give rise to fierce competition in all fields. In order to be able to win the competition and build a competitive advantage, organizations are required to continue to adapt and innovate in science and technology. One of the key resources for that is humans; Therefore, organizations need to realize professional employees who have the ability, skills, and productive work behavior in carrying out the main duties and functions of their positions ([Armstrong & Baron, 1998](#); [Sudarmanto, 2009](#)). Competency standards are a supporting factor for the success of organizational goals: a well-drawn HR competency map helps organizations set work standards and expectations to be achieved, becomes a tool for employee selection, and maximizes productivity ([Mangkunegara, 2012](#); [Moeheriono, 2010](#)).

The Makassar Maritime Science Polytechnic (PIP), which was established in 1921, until the time of the research has graduated around 10,000 cadets from three study programs: Nautical, Engineering, and Sea and Port Transportation Management (KALK). The KALK study program was opened in 1990-1994 at the D-III level (134 graduates) and upgraded to D-IV since 1995 with 310 graduates, including three batches of classes in collaboration with PT Pelindo IV which graduated 59 people in 2008-2010. PT Pelindo IV has effectively operated since the signing of the Company's Articles of Association on December 1, 1992 and has grown rapidly to adapt to the progress of the port business environment (Pelindo IV, 2017). The commitment of both parties to develop port human resources was confirmed through a Joint Agreement between the President Director of PT Pelindo IV and the Head of the Transportation Human Resources Development Agency (BPSDMP) on January 10, 2019, which includes the implementation of port education and training, apprenticeships, exchange of experts, utilization of facilities, certification, and the preparation of a joint syllabus which is followed up with a cooperation agreement.

The concept of link and match is central here: the systematic exploration of competencies needed by the future job market so that curricula and the higher education system remain aligned with job needs. Unemployment among higher education graduates has risen in recent years, largely because graduates are not equipped with the competencies the job market requires. Educational and training institutions can respond concretely by adjusting their programs to market needs. The latest national policy translates these ideas into the "8+i" link and match strategy (Directorate General of Vocational Education, 2021), which demands, among other things, a curriculum developed with industry, real project-based learning, the presence of practitioner guest lecturers, structured internships, competency certification, technology upgrades, joint applied research, and a commitment to graduate absorption. Through this kind of functional cooperation, guided by the principle of win-win partnership, universities have a great opportunity to produce prospective workers with high professionalism, since students gain real-world experience that goes beyond what the curriculum describes.

Although the idea of link and match has long been echoed, empirical studies on the relevance of the maritime vocational education curriculum in Indonesia still leave a number of gaps. First, most studies are in the form of descriptive tracer studies or one-way matching between course lists and work needs, without a well-established curriculum evaluation framework. Second, maritime education and training literature has so far been concentrated on the competencies of seafarers regulated by the STCW convention, while the competencies of port land human resources operations, engineering, logistics, and port management have been relatively rarely systematically studied. Third, the voice of graduate users (industry and regulators) as assessors of curriculum relevance is still rarely elaborated in a structured manner in one research design.

This study fills this gap by evaluating the relevance of the curriculum of the D-IV KALK PIP Makassar Program based on the perception of industry stakeholders and regulators. The novelty of the research lies in (1) mapping the four domains of competence of port human resources and their 27

subcompetencies as a benchmark for relevance, and (2) assessing the relevance of all 39 KALK curriculum courses by graduate users. Specifically, this study answers three questions: (1) what port human resource competencies are needed by PT Pelindo IV; (2) the extent to which the courses in the D-IV KALK curriculum are relevant to the needs of the competency needs; and (3) what aspects need to be strengthened so that the relevance of the curriculum is maintained in an ongoing manner.

Literature Review

Relevance of Curriculum, Link and Match, and Human Capital

The relevance of the curriculum refers to the suitability between the objectives, content, and learning experiences offered by educational institutions with the demands of knowledge development, the needs of students, and the needs of the world of work. In vocational education, the dimension of external relevance conformity to the needs of the job market is the most important measure of success because the mission of vocational education is to prepare graduates ready for work, as mandated by the guidelines for the preparation of higher education curriculum (Decree of the Minister of National Education No. 232/U/2000; Number 045/U/2002). Theoretically, this demand for relevance is rooted in the theory of human capital which views education as an investment whose value is determined by the increase in productivity and job absorption of graduates ([Becker, 1993](#)). An irrelevant curriculum means an inefficient investment for individuals, institutions, and the state.

In terms of learning design, relevance requires constructive alignment between learning outcomes, learning activities, and assessments ([Biggs & Tang, 2011](#)), in line with the principle of outcome-based education which emphasizes that recognized learning outcomes are real abilities that can be demonstrated by graduates ([Spady, 1994](#)). With this framework, the "relevance of courses" does not stop at the compatibility of the course name with the field of work, but concerns the alignment of competencies built by each course with the competencies needed by the position in the world of work.

Port Human Resources Competencies

Competency is understood as the fundamental characteristics of an individual knowledge, skills, and behaviors that are causally related to effective performance in a job ([Moeheriono, 2010](#); [Sudarmanto, 2009](#)). In the port sector, the port management literature groups competency needs into the operational, technical, logistics, and managerial domains, as ports transform from mere docking places to complex supply chain nodes ([Notteboom et al., 2022](#)). The study of the competencies of logistics and supply chain professionals also confirms that in addition to technical competence, managerial and interpersonal competencies communication, adaptation to change, and mastery of foreign languages are increasingly decisive ([Thai, 2012](#)). The four competency domains became the framework for assessing competency needs in this study.

Relevance Evaluation Based on Stakeholder Perception

Meaningful curriculum evaluation is geared towards improvement, not just proof ([Stufflebeam & Zhang, 2017](#)). In the context-input-process-product (CIPP) model, the assessment of stakeholder needs is the core of the context evaluation, while the assessment of the suitability of educational outcomes with these needs is part of the product evaluation. This research positions itself on these two dimensions: mapping the needs of industrial competencies (context) and assessing the relevance of the curriculum to them (products). In terms of measurement techniques, importance rating by stakeholders is an established practice and becomes the basis for interest-performance analysis ([Martilla & James, 1977](#)), so that the results of the ranking can be used as a basis for determining curriculum development priorities.

Research Design and Methodology

Research Design

This study uses a descriptive design with a qualitative approach that is reinforced by perceptual quantitative data. The qualitative approach was chosen because curriculum relevance is a phenomenon that requires contextual interpretation from actors who understand the world of port

work, while perceptual quantitative data (importance and relevance scores) are used to map patterns in a concise and comparable manner ([Creswell & Plano Clark, 2018](#)). The quality of the data from the research results is determined by two main things, namely the quality of the research instruments and the accuracy of the data collection method ([Sugiyono, 2009](#)).

Location and Informant

The research was carried out at PT Pelabuhan Indonesia IV (Persero) in Makassar as the main user of KALK PIP Makassar graduates. The informants were determined by purposive sampling technique as many as 14 people from among the officials of the Ministry of Transportation and PT Pelindo IV, with the following criteria: (1) holding positions directly related to human resource management, operations, or port education coaching; (2) have an adequate working period to assess competency needs; and (3) get to know the profile of KALK graduates. All informants were interviewed; eight of them completed the assessment questionnaire so that it becomes a perceptual quantitative database.

Data Collection Techniques

Three techniques are used triangulatively. First, a closed questionnaire with a four-point scale (1 = not important/irrelevant to 4 = very important/very relevant) which contains 27 port subcompetencies in four competency domains and 39 D-IV KALK curriculum courses. Second, semi-structured interviews to explore the informant's meaning of competency needs, relevance of courses, and expectations for the implementation of education. Third, a study of documents on the structure of the KALK curriculum (39 courses, one land practice, and one character development with a total of 147 credits), Regulation of the Minister of Transportation Number KM 46 of 2009 concerning Minimum Service Standards at PIP Makassar, as well as the company's annual report ([Pelindo IV, 2017](#)).

Data Analysis Techniques and Validity

Perceptual quantitative data were analyzed with descriptive statistics (average, maximum value, and minimum). The average interpretation uses the category interval: 1.00-1.75 is irrelevant/irrelevant; 1.76-2.50 less important/less relevant; 2.51-3.25 important/relevant; and 3.26-4.00 is very important/very relevant. Qualitative data were analyzed with an interactive model through the stages of data reduction, data presentation, and conclusion drawing (Miles et al., 2014): data from interviews and literature reviews were recorded in detail, grouped, and focused on important points; presented in the form of narrative texts; Then conclusions were drawn to answer the purpose of the research. The validity of the findings is maintained through triangulation of sources (regulators and port operators) and triangulation of techniques (questionnaires, interviews, documents), as well as reconfirmation of the summary of findings to some informants (member checking) as suggested by [Lincoln and Guba \(1985\)](#).

Findings and Discussion

Port Human Resources Competencies Needed by the Industry

The results of interviews and questionnaire assessments confirmed the four groups of port human resource competencies needed by the industry: (1) port operational competencies with 10 subcompetencies; (2) port engineering competencies with 4 subcompetencies; (3) Logistics Competencies with 6 Subcompetencies; and (4) port management competencies with 7 subcompetencies—a total of 27 subcompetencies. Of the 27 subcompetencies, 26 were assessed in the range of 3.00-3.50 (important to very important); Only one subcompetency, namely the handling of docked ships, obtained an average of 2.88. The average of each group is port operations of 3.36; port engineering 3.19; logistics affairs 3.25; and port management 3.39. Thus, the port management competency group is perceived as the most important, followed by port operations. Details of the assessment are presented in Table 1.

Table 1. Stakeholder Perception of Port Competency Importance Level (n = 8; scale 1-4)

	Port Subcompetence	Average Importance
PORT OPERATIONAL COMPETENCE (group average = 3.36)		
1	Port navigation and traffic control	3.25
2	Planning and operation for conventional cargo terminals	3.50
3	Field and warehouse operations	3.38
4	Load operations at each station	3.50
5	Operation of container ships	3.38
6	Planning of docking ships	3.38
7	Handling of docked vessels	2.88
8	Operation of moving goods from the dock	3.50
9	Handling of dangerous cargo	3.50
10	Cargo handling	3.38
PORT ENGINEERING COMPETENCY (group average = 3.19)		
11	Equipment safety handling	3.13
12	Equipment operating procedure	3.25
13	Solving technical problems	3.25
14	Equipment maintenance and repair	3.13
COMPETENCE IN LOGISTICS AFFAIRS (group average = 3.25)		
15	Contract management	3.25
16	Purchasing	3.13
17	Material handling	3.25
18	Transportation management	3.25
19	Storage management	3.38
20	Warehousing	3.25
PORT MANAGEMENT COMPETENCE (group average = 3.39)		
21	Port strategic planning and operations planning	3.50
22	Mastery of information systems	3.25
23	Time at port and port productivity (KPI)	3.50
24	Role and function of ports	3.50
25	Ability to adapt to organizational culture changes	3.38
26	Ability to communicate verbally and in writing	3.38
27	Proficiency in two or more foreign languages	3.25

Source: Data processing (2026)

Relevance of the D-IV KALK Curriculum Course

The applicable D-IV KALK curriculum structure contains 39 courses, one land practice, and one character development with a total of 147 credits taken during eight semesters of lectures and two semesters of land practice. The courses are divided into the Personality Development Course (MKPK, 6 courses), Basic Skills Course (MKDK, 2 courses), Expertise Course (MKK, 31 courses), Land Practice, and Character Development.

The assessment results showed that 36 out of 39 courses obtained an average of 3.00-3.50 (relevant to very relevant). Three courses obtained an average of 2.88, namely Bahasa Indonesia, Purchase and Lease of Ships, and Maritime Insurance still in the relevant category, but the lowest compared to other courses. The average for each group is MKPK 3.21; MKDK 3.25; MKK 3.22; Land Practice 3.38; and Character Development 3.50. The highest score in Character Development confirms that graduate

users place character and discipline as the main advantages of PIP Makassar graduates; However, some informants reminded that the pattern of discipline development on campus continues to be adjusted to the times. Details of relevance values are presented in Table 2.

A number of informants also underlined that the assessment of the distribution of courses between semesters requires a special study. Perception is not enough to be shaped by the name of the course in the curriculum structure; The scope of discussion, competency standards, and basic competencies in the syllabus need to be understood thoroughly so that the position of each course in building competencies across semesters continuously can be assessed comprehensively. In general, the distribution of courses from semester one to eight is considered quite adequate by stakeholders.

Table 2. Relevance Value of D-IV KALK Curriculum Courses by Stakeholders (n = 8; scale 1-4)

	Courses	Average Relevance
Personality Development Course / MKPK (group average = 3.21)		
1	Religion Education	3.38
2	São Paulo	3.25
3	Citizenship (Civic Education)	3.38
4	Bahasa Indonesia (Indonesian Language)	2.88
5	Culture of Safety, Security and Service	3.25
6	Psychology and Personality	3.13
Basic Expertise Course / MKDK (group average = 3.25)		
1	Religion*	3.38
2	Pancasila*	3.13
Expertise / MKK Courses (group average = 3.22)		
1	Port Laws and Regulations and Related Laws	3.38
2	English	3.25
3	Management Basics	3.13
4	Sea Freight Management	3.25
5	Import Export Trade	3.25
6	National Shipping Regulations and International Conventions	3.25
7	Accounting Basics	3.25
8	Occupational Health and Safety	3.25
9	Port and Municipal Authority	3.25
10	Immigration and Customs	3.13
11	Port Quarantine and Health	3.13
12	Ship Loading, Marketing and Negotiation	3.25
13	Fleet of Ships	3.25
14	Ship Ownership Status	3.13
15	Ship Chartering Business	3.13
16	Purchase and Lease of Ships	2.88
17	Ship Operation	3.13
18	Customers, Intermediaries, Ship Charterers and Market Introduction	3.38
19	Research and Statistics Methodology	3.13
20	Ship Agency Business	3.38
21	Conventional Port and Container Terminal Operations	3.50
22	Risk Management	3.25
23	Maritime Insurance	2.88
24	Sea Freight Rates (Freight)	3.25
25	Logistics and Supply Chain Management	3.25
26	Leadership and Work Ethic	3.38

	Courses	Average Relevance
27	Multimodal Transportation and Freight Forwarding	3.25
28	Entrepreneurship, Innovation and Creativity	3.38
29	Quality Assurance Management	3.25
30	Maritime	3.25
31	Final Project	3.00
Land Practice (group average = 3.38)		
1	Fieldwork Practice (Record Book)	3.38
Character Development (group average = 3.50)		
1	Character Building on Campus	3.50

Source: Data processing (2026)

Discussion

The finding that all competency domains are considered important to very important, and that almost all courses are considered relevant, confirms that the KALK curriculum structure in general has "spoken the same language" as the needs of the port industry. Interestingly, the port management domain—which includes the subcompetencies of oral and written communication, mastery of foreign languages, and the ability to adapt to organizational cultural changes obtained the highest average (3.39). These findings are consistent with the literature on logistics and port professional competencies that show a shift in weight from purely technical competencies towards managerial and interpersonal competencies ([Notteboom et al., 2022](#); [Thai, 2012](#)). The highest relevance scores in Character Development (3.50) and Land Practice (3.38) reinforce the same pattern: graduate users highly value the attributes of work attitude, discipline, and real-world experience—capital that is difficult to form by classroom learning alone.

The three courses with the lowest average (2.88) do not necessarily have to be deleted. The Indonesian language may be perceived as a generic content that is less directly related to port work; Purchase and Lease of Ships and Maritime Insurance are specific to certain business segments that are not covered by all informants; Likewise, the subcompetence of handling docked ships which in practice is mostly in the domain of scouting. The implication is contextualization, not elimination: strengthening the relationship of the material with actual port cases and documents (e.g. writing reports and business correspondence for Bahasa Indonesia, as well as case studies of claims and *charter parties* for insurance and ship leasing) so that their usefulness is more felt in the world of work.

Read with the framework of CIPP ([Stufflebeam & Zhang, 2017](#)), the findings of this study are an evaluation of the dimensions of context (industrial competency needs) and products (curriculum relevance to these needs). Consequently, the next improvement agenda is in the input and process dimensions: improving the competence of lecturers in the port sector, interactive learning methods that are connected to rapidly developing business practices, and structured internships. This agenda is in line with the eight connectivity packages in the *8+i link and match strategy* (Directorate General of Vocational Education, 2021). The BPSDMP-Pelindo IV Joint Agreement in 2019 has provided the right institutional umbrella; The challenge is to translate it into a detailed program: preparation of a joint syllabus, practitioner guest lecturers, apprenticeships and lecturers, and competency certification.

Beyond the items measured, industry developments demand attention to prospective competencies that are not yet explicit in the curriculum structure: port digitalization (including terminal operating systems, *port community systems*, and automation), sustainability and green ports, as well as port performance data analytics ([Notteboom et al., 2022](#); [UNCTAD, 2024](#)). Pelindo's post-2021 integration, which brings standardization of business processes and information technology systems, increases this urgency. Curriculum updates should place digital competencies as content across courses, not just individual courses.

Theoretically, this study shows that the framework of four port competency domains with 27 subcompetencies can be used as an instrument to assess the relevance of the port vocational curriculum, complementing the maritime education literature that has been focusing on seafarers' competencies. Practically, the results of the importance ranking provide the basis for determining

development priorities: maintaining strength in character development and land practices, strengthening the implementation of learning skills courses, and following up on industrial cooperation programmatically.

This research has a number of limitations. First, the locus is limited to one graduate user (PT Pelindo IV), so generalization to other operators or regions must be done carefully—especially after the integration of Pelindo in 2021 changed the organizational structure of graduate users. Second, the quantitative database comes from eight informants who complete the questionnaire so that the average number is indicative, not inferential. Third, the instrument has not been formally tested for content validity and reliability. Fourth, the cross-cut design does not capture the dynamics of intertemporal competency needs. Further research is recommended: (1) expanding respondents across ports and business segments with testing of content validity (e.g. Aiken index) and instrument reliability; (2) applying a two-dimensional performance and interest analysis by assessing not only the interests of competencies but also the actual performance of graduates ([Martilla & James, 1977](#)); (3) conducting *a longitudinal tracer study* to relate the relevance of the curriculum to job absorption; and (4) evaluating the dimensions of input and curriculum processes as a whole with the CIPP model

Conclusion

Based on the results of the research, three things can be concluded. First, the competency needs of port human resources at PT Pelindo IV are mapped into four groups port operations, port engineering, logistics affairs, and port management with 27 subcompetencies that are almost all considered important to very important; Port management competence is perceived as the most important. Second, the curriculum of the D-IV KALK PIP Makassar Program is considered relevant to the needs of these competencies: 36 out of 39 courses obtained high relevance scores, with character development and land practice as the components that graduate users value the most. Third, the relevance that has been achieved needs to be maintained through the implementation of interactive and contextual learning, improving the competence of lecturers in the port sector in collaboration with industry, periodic curriculum reviews involving stakeholders, follow-up of the BPSDMP-Pelindo IV Joint Agreement into a detailed program for port human resource development, as well as updating the content of digitalization and port sustainability. Stakeholders' perception of port competence will continue to grow rapidly with the times; Institutional communication between PIP Makassar and industry is the key to a sustainable relationship and match.

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